Understanding sustainable development in Finnish water supply and sanitation services

Water supply and sanitation services are essential to human and environmental well-being. Globally one of the biggest challenges to sustainable development is lack of access to improved water supply and sanitation services. Yet it is less obvious what sustainable development means in countries with high coverage of these services. In this article sustainable development is explored from the perspective of Finnish water supply and sanitation services. The study consists of eight semi-structured interviews with water sector experts and their views are analysed in relation to literature. In this article sustainable development is understood as a learning process and dialogue of values. The interviewed water sector experts primarily perceive sustainable development from an environmental point of view, and treat it in a rationalistic and mechanistic manner. Challenges are tackled by technological fixes, such as improving energy and material efficiency. It is argued in this paper that this kind of approach undermines the complexity and dynamicity of sustainable development and can suppress learning. Sustainable development is mostly explored only from the perspective of water services, although some of the interviewees recognise their role for wider societal development. Interaction and dialogue between water sector experts and the community regarding sustainable development is lacking or skills to accomplish this interaction are inadequate.
Landowners' willingness to promote bioenergy production on wasteland – future impact on land use of cutaway peatlands

Landowners are the key players in bioenergy production on wasteland; such as cutaway peatlands. In this study, the landowner's interest to use cutaway peatlands for bioenergy production was investigated using a survey and GIS (Geographic Information Systems) methods in an area in South Ostrobothnia, Finland. The focus was to identify which different bioenergy production chains are preferred by the respondents: combustion, gasification or biogas production from agriculture, energy-willow short-rotation forestry or forestry based energy crops. Also, the influence of personal environmental values on the selection was measured and the future impacts and barriers for the land use were assessed.

Afforestation was the most popular after-use method among the landowners. The next most favorable method was energy crop cultivation but it was highly dependent on economic profitability and subsidies. Currently, approximately 8.2% or 500 ha of the total peat extraction area could be used for bioenergy production in the region by 2035. Based on the survey, forest based biomass is the best option if bioenergy is to be produced. The next choice was agro biomass and the least favored plant was willow. This study suggests that the biggest cutaway peatlands will be converted to forest energy in the future. Suggestive results were that the owners with high environmental values are especially interested in agro biomass growing and the landowner having a distant home place does not have a negative influence on bioenergy production.

Altogether, land use and biomass production of cutaway peatlands is connected with the demands of the Finnish bio-economy.
Recycling potential of post-consumer plastic packaging waste in Finland

Recycling of plastics is urged by the need for closing material loops to maintain our natural resources when striving towards circular economy, but also by the concern raced by observations of plastic scrap in oceans and lakes. Packaging industry is the sector using the largest share of plastics, hence packaging dominates in the plastic waste flow. The aim of this paper was to sum up the recycling potential of post-consumer plastic packaging waste in Finland. This potential was evaluated based on the quantity, composition and mechanical quality of the plastic packaging waste generated by consumers and collected as a source-separated fraction, within the mixed municipal solid waste (MSW) or within energy waste.

Based on the assessment 86,000–117,000 tons (18 kg/person/a) of post-consumer plastic packaging waste was generated in Finland in 2014. The majority, 84% of the waste was in the mixed MSW flow in 2014. Due to the launching of new sorting facilities and separate collections for post-consumer plastic packaging in 2016, almost 40% of the post-consumer plastic packaging could become available for recycling. However, a 50% recycling rate for post-consumer plastic packaging (other than PET bottles) would be needed to increase the overall MSW recycling rate from the current 41% by around two percentage points.

The share of monotype plastics in the overall MSW plastics fraction was 80%, hence by volume the recycling potential of MSW plastics is high. Polypropylene (PP) and low density polyethylene (LDPE) were the most common plastic types present in mixed MSW, followed by polyethylene terephthalate (PET), polystyrene (PS) and high density polyethylene.
If all the Finnish plastic packaging waste collected through the three collection types would be available for recycling, then 19,000–25,000 tons of recycled PP and 6000–8000 tons of recycled HDPE would be available on the local market. However, this assessment includes uncertainties due to performing the composition study only on mixed MSW plastic fraction. In order to obtain more precise figures of the recycling potential of post-consumer plastic packaging, more studies should be performed on both the quantities and the qualities of plastic wastes.

The mechanical and rheological test results indicated that even plastic wastes originating from the mixed MSW, can be useful raw materials. Recycled HDPE showed a smaller decline in the mechanical properties than recycled PP. The origin and processing method of waste plastic seemed to have less effect on the mechanical quality than the type of plastic. The applicability of a plastic waste for a product needs to be assessed case by case, due to product specific quality requirements. In addition to mechanical properties, the chemical composition of plastic wastes is of major importance, in order to be able to restrict hazardous substances from being circulated undesirably.

In addition to quantity and quality of plastic wastes, the sustainability of the whole recycling chain needs to be assessed prior to launching operations so that the chain can be optimized to generate both environmental and economic benefits to society and operators.

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Materials Science
Authors: Dahlbo, H., Poliakova, V., Mylläri, V., Sahimaa, O., Anderson, R.
Publication date: 31 Oct 2017
Peer-reviewed: Yes

Publication information
Journal: Waste Management
ISSN (Print): 0956-053X
Ratings:
- Scopus rating (2016): CiteScore 4 SJR 1.354 SNIP 2.044
- Scopus rating (2015): SJR 1.739 SNIP 2.256 CiteScore 4.33
- Scopus rating (2014): SJR 1.777 SNIP 2.482 CiteScore 3.43
- Scopus rating (2013): SJR 1.822 SNIP 2.435 CiteScore 3.39
- Scopus rating (2012): SJR 1.611 SNIP 2.184 CiteScore 2.91
- Scopus rating (2011): SJR 1.698 SNIP 2.085 CiteScore 2.99
- Scopus rating (2010): SJR 1.555 SNIP 1.78
- Scopus rating (2009): SJR 1.502 SNIP 1.899
- Scopus rating (2008): SJR 1.378 SNIP 2.13
- Scopus rating (2007): SJR 1.035 SNIP 1.767
- Scopus rating (2006): SJR 1.046 SNIP 1.749
- Scopus rating (2005): SJR 1.059 SNIP 1.65
- Scopus rating (2004): SJR 1.289 SNIP 1.939
- Scopus rating (2003): SJR 0.847 SNIP 1.269
- Scopus rating (2002): SJR 0.561 SNIP 0.874
- Scopus rating (2001): SJR 0.456 SNIP 0.696
- Scopus rating (2000): SJR 0.271 SNIP 0.451
- Scopus rating (1999): SJR 0.262 SNIP 0.479
Original language: English
DOI: 10.1016/j.wasman.2017.10.033
Research output: Scientific - peer-review › Article

Recycling mine tailings in chemically bonded ceramics - A review
Mine tailings account for most of the environmental incidents related to the extractive industry, with risks increasing due to steadily rising tonnage of low-grade ore and extreme weather events. Recycling of tailings in raw-material-intensive applications presents an interesting alternative to costly tailings management with associated restoration efforts. Chemically bonded ceramics may offer a route to upgrading mine tailings into raw materials for ceramics. In this review such chemically bonded ceramic methods that may be used to recycle mine tailings as raw materials, are reviewed while focusing in particular on two methods: 1) geopolymerization/alkali activation and 2) chemically bonded phosphate ceramics. The aim of the review is not to give exhaustive review on the wide topic, but to scope the required boundary conditions that need to be met for such utilization. According to the findings, alkali activation has been studied for 28 separate silicate minerals in the scientific literature, and presents a viable method, which is already in commercial use in
calcium-rich cement-like binder applications. Phosphate bonding literature is more focused on phosphate containing minerals and waste encapsulation. Very little work has been done on low-calcium tailings utilization with either technology, and more knowledge is needed on the effect of different pre-treatment methods to increase reactivity of mine tailings in chemically bonded ceramics.

**General information**
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Materials Science, Research group: Ceramic materials, University of Oulu
Authors: Kinnunen, P., Ismailov, A., Solismaa, S., Sreenivasan, H., Räisänen, M., Levänen, E., Illikainen, M.
Pages: 634-649
Publication date: 26 Oct 2017
Peer-reviewed: Yes

**Publication information**
Journal: Journal of Cleaner Production
Volume: 174
ISSN (Print): 0959-6526
Ratings:
- Scopus rating (2016): CiteScore 5.83, SJR 1.615, SNIP 2.382
- Scopus rating (2015): SJR 1.609, SNIP 2.383, CiteScore 5.57
- Scopus rating (2014): SJR 1.661, SNIP 2.477, CiteScore 4.6
- Scopus rating (2013): SJR 1.644, SNIP 2.581, CiteScore 4.47
- Scopus rating (2012): SJR 1.706, SNIP 2.328, CiteScore 4.07
- Scopus rating (2011): SJR 1.461, SNIP 1.825, CiteScore 3.19
- Scopus rating (2010): SJR 1.419, SNIP 1.742
- Scopus rating (2009): SJR 0.942, SNIP 1.544
- Scopus rating (2008): SJR 0.813, SNIP 1.354
- Scopus rating (2007): SJR 0.942, SNIP 1.489
- Scopus rating (2006): SJR 0.842, SNIP 1.543
- Scopus rating (2005): SJR 0.544, SNIP 1.357
- Scopus rating (2004): SJR 0.753, SNIP 1.818
- Scopus rating (2003): SJR 0.501, SNIP 1.152
- Scopus rating (2002): SJR 0.481, SNIP 1.103
- Scopus rating (2001): SJR 0.419, SNIP 0.85
- Scopus rating (2000): SJR 0.694, SNIP 0.888
- Scopus rating (1999): SJR 0.276, SNIP 0.775
Original language: English
DOIs:
10.1016/j.jclepro.2017.10.280
Research output: Scientific - peer-review › Article

**Yhdyskuntien vesihuolto – kehityksen ja elämän ehto**

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering
Authors: Juuti, P., Katko, T. S., Rajala, R.
Number of pages: 34
Pages: 197-231
Publication date: 5 Oct 2017

**Host publication information**
Title of host publication: Miten Suomesta tuli tekniikan maa. Luku 4: Mikä maa, mikä tekniikka? Tekniikan Museon julkaisuja 8. : How Finland Became a Country of Technology
Volume: 8
Place of publication: Helsinki
Publisher: Tekniikan museo
Editor: Männistö-Funk, T.
ISBN (Print): 978-951-95233-7-8
Yli 60 tonnin yhdistelmät parantaneet kuljetusten tehokkuutta

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Civil Engineering
Authors: Liimatainen, H.
Pages: 30-32
Publication date: 4 Sep 2017
Peer-reviewed: Unknown

Publication information
Journal: Tie ja Liikenne
Volume: 2017
Issue number: 4
ISSN (Print): 0355-7855
Original language: Finnish
Links: https://issuu.com/tieyhdistys/docs/tl_4-2017
Research output: Professional › Article

The effect of lake bottom sediment layers on radionuclide transport from bedrock to biosphere and doses to humans

General information
State: Published
Organisations: Pori, Research group: Data-analytics and Optimization
Authors: Pohjola, J., Turunen, J., Lipping, T.
Number of pages: 2
Pages: 439-440
Publication date: 3 Sep 2017
Peer-reviewed: Unknown
Event: Paper presented at 4th International Conference on Radioecology & Environmental Radioactivity, Berlin, Germany.
ASJC Scopus subject areas: Computer Science Applications

Bibliographical note
The role of inorganics in modelling of biomass gasification

In this work, a summary of the research carried out about the role of inorganic elements in biomass gasification is presented. The research work has focused on the catalytic effects of alkali and alkaline earth metals in char gasification. The work has included gasification experiments using thermogravimetric analysis (TGA) and fluidized beds as well as modeling techniques. The results of the research presented in this paper indicate that the laboratory measured TGA reactivity numbers and correlations (including the effect of fuel ash inorganics) are possible to be converted to numbers predicting carbon conversion in a large scale fluidized bed gasification reactor. The model, called Carbon Conversion Predictor, is a relatively simple and transparent tool for the comparison of the gasification reactivity of different fuels in fluidized bed gasification.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Chemistry and Bioengineering, Research group: Bio- and Circular Economy, Univ Seville, University of Sevilla, Chem & Environm Engn Dept, Bioenergy Grp, Escuela Super Ingenieros
Authors: Kontinen, J., Kramb, J., DeMartini, N., Gomez-Barea, A.
Liikenteen päästötavoitteiden saavuttaminen 2030 - politiikkatoimenpiteiden tarkastelu

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Civil Engineering, Research group: Transport Research Centre Verne
Authors: Liimatainen, H., Viri, R.
Publication date: 30 May 2017

Publication information
Publisher: Suomen ilmastopaneeli
Original language: Finnish
Links:
Research output: Professional › Commissioned report

Global challenges and role of institutions in water services

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Civil Engineering
Authors: Katko, T. S.
Number of pages: 1
Pages: 15
Publication date: 9 May 2017
Peer-reviewed: Unknown

Publication information
Journal: Econetin asakaslehti AQ
Issue number: 1
ISSN (Print): 1799-7763
Original language: English
Links:
http://digimag.econetgroup.fi/digimag/117-english/aqen0117_01-xml
Research output: Professional › Article

Vesihuollon globaalit haasteet ja instituutioiden roolit

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Civil Engineering
continues in future also. Every human activity is left with some waste. There are some major sectors for waste generation, such as manufacturing sector, agricultural sector (in the form of biomass) and municipality waste etc. These wastes are having minimal value or even negative values and creating problem or burden to the environment, human health etc. Therefore, it is utmost important to process and manage those wastes properly. The existing waste management processes involves: recycling, dumping and landfilling, incineration/combustion etc., which are neither sufficient to nullify the adverse effect of the waste nor economic process. These management processes involve human intervention and thereby resulting huge expenses. Nowadays, there is a paradigm shift from management of waste into conversion of waste producing fertilizer, fuel, energy as well as carbon materials etc. In this review, effort is given exclusively to summarize the different processes of waste conversion into functional carbon material such as activated carbon, porous carbon, carbon nanotube, graphene, carbon dot, carbon fibre etc. It has been discussed with the help of illustrative examples from the literatures.

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Materials Science, Research group: Plastics and Elastomer Technology
Authors: Gogoi, M., Layek, R., Vuorinen, J., Mahato, M.
Pages: 52-68
Publication date: 1 Mar 2017
Peer-reviewed: Yes

Publication information
Journal: Energy and Environment Focus
Volume: 6
Issue number: 1
ISSN (Print): 2326-3040
Original language: English
DOIs: 10.1166/eef.2017.1237
Research output: Scientific - peer-review » Review Article

Operationalising the right to water and sanitation and gender equality via appropriate technology in rural Nepal
Can a tap, a squat toilet, or an improved cooking stove – all simple rural technologies – make a contribution to achieving human rights and the Sustainable Development Goals (SDGs)? What are the ‘soft’ elements, beyond the technology, that are needed? This article explores how, the principles of human rights based approach (HRBA), gender equality and social inclusion (GESI) are mainstreamed and operationalized through two bilateral rural water projects in Nepal - the Finland and Nepal-funded Rural Water Supply and Sanitation Project in Western Nepal (RWSSP-WN) and the Rural Village Water Resources Management Project (RVWRMP). The projects utilise a combination of hands-on technical assistance, community participation and appropriate technologies to achieve the Right to Water and Sanitation, as well as making a contribution to the SDGs. The technologies include water supply systems; renewable energy, including micro-hydropower schemes, improved cooking stoves, improved water mills and hydraulic ram pumps; as well as water seal toilets. However, simply providing technology is not enough. It is critical that it is applied within a strong planning and implementation framework, integrated in local government and communities, but supported with skilful facilitation. This case study focuses on the results achieved and critical lessons learned regarding gender equality and empowerment (SDG 5), and access to water and sanitation (SDG 6). The lessons learned, including the important role of the technical staff in the project modality, are valuable for planners and implementers of water and sanitation projects elsewhere.

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Civil Engineering
Authors: White, P., Rautanen, S., Nepal, P. R.
Number of pages: 23
Pages: 217-239
Publication date: 1 Mar 2017

Host publication information
Title of host publication: Human Rights and Technology
Place of publication: Costa Rica
Publisher: University of Peace, Costa Rica
Editor: Garrido Villareal, M.
ISBN (Electronic): 978-9930-542-00-2
Keywords: 214 Mechanical engineering, Water and Sanitation, 5203 Development Studies, Human Rights, Gender, Nepal, Social Inclusion
Source: Bibtex
Source-ID: urn:de56f6bb4591a0c82a8d620136c3fd9c
Replacing centralised waste and sanitation infrastructure with local treatment and nutrient recycling: Expert opinions in the context of urban planning

Solutions for resource scarcity should be sought from urban waste management and sanitation, which are characterised by central plants and long networks. The socio-technical transition to more sustainable infrastructure is expected to include partial decentralisation based on local conditions. This paper focuses on drivers, barriers and enablers in implementing a decentralised circular system in a new residential area (Tampere, Finland). In the alternative system, biowaste and feces are treated in a local biogas plant, and nutrient and energy output are utilised within the area. This research aims to understand what kind of urban planning enables alternative infrastructure, as well as the characteristics of an innovation capable of making a breakthrough. Seventeen infrastructure planning experts were interviewed, then assembled to re-develop ideas arising from the interviews. Based on these qualitatively analysed data, 11 factors which help the adoption of the alternative system were formulated. The results indicate that sustainability transition can be facilitated through impartial urban planning that allows the early participation of actors and improved communications. Additionally, studying the impact of alternative solutions and city guidance according to environmental policy aims may enhance transition. Innovation success factors include suitable locations, competent partners, mature technology and visible local benefits.

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Särkilahti, M., Kinnunen, V., Kettunen, R., Jokinen, A., Rintala, J.
Publication date: 21 Feb 2017
Peer-reviewed: Yes

Publication information
Journal: Technological Forecasting and Social Change
ISSN (Print): 0040-1625
Ratings:
Scopus rating (2016): CiteScore 3.03 SJR 1.247 SNIP 1.635
Scopus rating (2015): SJR 1.282 SNIP 1.849 CiteScore 3.28
Scopus rating (2014): SJR 1.291 SNIP 1.781 CiteScore 2.88
Scopus rating (2013): SJR 1.281 SNIP 1.739 CiteScore 2.93
Scopus rating (2012): SJR 1.507 SNIP 2.009 CiteScore 2.92
Scopus rating (2011): SJR 1.094 SNIP 1.582 CiteScore 2.37
Scopus rating (2010): SJR 1.018 SNIP 1.47
Scopus rating (2009): SJR 0.838 SNIP 1.589
Scopus rating (2008): SJR 0.848 SNIP 1.502
Scopus rating (2007): SJR 0.628 SNIP 1.377
Scopus rating (2006): SJR 0.568 SNIP 1.171
Scopus rating (2005): SJR 0.527 SNIP 1.614
Scopus rating (2004): SJR 0.343 SNIP 0.897
Scopus rating (2003): SJR 0.409 SNIP 0.97
Scopus rating (2002): SJR 0.431 SNIP 1.007
Scopus rating (2001): SJR 0.609 SNIP 0.843
Scopus rating (2000): SJR 0.209 SNIP 0.304
Scopus rating (1999): SJR 0.272 SNIP 0.986
Original language: English
ASJC Scopus subject areas: Business and International Management, Applied Psychology, Management of Technology and Innovation
Keywords: Alternative sanitation, Biogas, Nutrient recycling, Socio-technical transition, Tampere, Urban land-use planning
DOIs:
10.1016/j.techfore.2017.02.020
Source: Scopus
Source-ID: 85013157702
Research output: Scientific - peer-review » Article

Long term stability of air processed inkjet infiltrated carbon-based printed perovskite solar cells under intense ultra-violet light soaking
The long term stability of air processed inkjet infiltrated carbon based perovskite solar cells (CPSCs) is investigated under intense ultra-violet light soaking equivalent to 1.5 Sun UV light illumination. Two batches of the fabricated CPSCs were exposed systematically i.e. first without implementing any protective coating and then epoxying the CPSCs through a low cost commonly available epoxy which was applied to serve as a barrier against moisture and humidity intrusion. The CPSCs with no protective layer against moisture and humidity exhibited impressive preliminary stability for hundreds of hours during their exposure to intense UV light and provided great motivation to test the CPSCs further with more optimization. As a result, the CPSCs having commonly available epoxy as a protective barrier exhibited remarkable durability and showed no performance degradation for a period of 1002 hours under intense and continuous 1.5 Sun equivalent UV light illumination proving that the technology is clearly not inherently unstable and that future developments might lead to market breakthroughs.

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Chemistry and Bioengineering, Research group: Supramolecular photochemistry, Aalto University, Solaronix, Ecole Polytechnique Fédérale de Lausanne
Authors: Hashmi, S. G., Tiihonen, A., Martineau, D., Özkan, M., Vivo, P., Kaunisto, K., Vainio, U., Zakeeruddin, S. M., Grätzel, M.
Pages: 4797-4802
Publication date: 10 Feb 2017
Peer-reviewed: Yes

Publication Information
Journal: Journal of Materials Chemistry A
Issue number: 10
ISSN (Print): 2050-7488
Ratings:
Scopus rating (2016): SJR 3.037 SNIP 1.468 CiteScore 8.46
Scopus rating (2015): SJR 2.672 SNIP 1.663 CiteScore 8.36
Scopus rating (2014): SJR 2.343 SNIP 1.526 CiteScore 7.27
Original language: English
DOI:
10.1039/C6TA10605F

Bibliographical note
EXT="Kaunisto, Kimmo"
Research output: Scientific - peer-review › Article

The effect of anode potential on bioelectrochemical and electrochemical tetrathionate degradation
The effect of poised anode potential on electricity production and tetrathionate degradation was studied in two-chamber flow-through electrochemical (ES) and bioelectrochemical systems (BES). The minimum anode potential (vs. Ag/AgCl) for positive current generation was 0.3 V in BES and 0.5 V in the abiotic ES. The anode potential required to obtain average current density above 70 mA m-2 was 0.4 V in BES and above 0.7 V in ES. ES provided higher coulombic efficiency, but the average tetrathionate degradation rate remained significantly higher in BES (above 110 mg L-1 d-1) than in the abiotic ES (below 35 mg L-1 d-1). This study shows that at anode potentials below 0.7 V, the electrochemical tetrathionate degradation is only efficient with microbial catalyst and that significantly higher tetrathionate degradation rates can be obtained with bioelectrochemical systems than with electrochemical systems at the tested anode potentials.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: L.K. Sulonen, M., Lakaniemi, A., Kokko, M. E., Puhakka, J. A.
Number of pages: 8
Pages: 173-180
Publication date: Feb 2017
Peer-reviewed: Yes
Early online date: 8 Dec 2016

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Journal: Bioresource Technology
Volume: 226
ISSN (Print): 0960-8524
Ratings:
Scopus rating (2016): CiteScore 5.94 SJR 2.191 SNIP 1.91
Scopus rating (2015): SJR 2.255 SNIP 1.908 CiteScore 5.47
Scopus rating (2014): SJR 2.41 SNIP 2.104 CiteScore 5.3
Scopus rating (2013): SJR 2.412 SNIP 2.503 CiteScore 5.97
Scopus rating (2012): SJR 2.389 SNIP 2.465 CiteScore 5.25
Scopus rating (2011): SJR 2.314 SNIP 2.508 CiteScore 5.56
Scopus rating (2010): SJR 2.086 SNIP 2.355
Scopus rating (2009): SJR 1.912 SNIP 2.231
Scopus rating (2008): SJR 1.734 SNIP 2.732
Scopus rating (2007): SJR 1.529 SNIP 2.423
Scopus rating (2006): SJR 1.315 SNIP 1.98
Scopus rating (2005): SJR 1.269 SNIP 2.006
Scopus rating (2004): SJR 1.197 SNIP 1.659
Scopus rating (2003): SJR 0.948 SNIP 1.639
Scopus rating (2002): SJR 0.882 SNIP 1.3
Scopus rating (2001): SJR 0.541 SNIP 1.208
Scopus rating (2000): SJR 0.464 SNIP 1.049
Scopus rating (1999): SJR 0.669 SNIP 1.061
Original language: English
Keywords: Bioelectrochemical cell, Electrochemical cell, Tetrathionate, Anode potential, Current generation
DOIs:
10.1016/j.biortech.2016.12.023
Links:
Source: RIS
Source-ID: urn:6A72F358ABAE0BB9DC836F7776FCED75
Research output: Scientific - peer-review › Article

Chasing measurements for real-world emissions of city buses

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Järvinen, A., Karjalainen, P., Bloss, M., Potila, O., Simonen, P., Kuuluvainen, H., Timonen, H., Saarikoski, S., Niemi, J. V., Keskinen, J., Rönkkö, T.
Publication date: 2017
Peer-reviewed: Unknown
Keywords: Exhaust emissions, bus emissions, Air quality
ASJC Scopus subject areas: Automotive Engineering, Pollution, Energy (miscellaneous)
Research output: Scientific › Paper, poster or abstract

Comparison of air pressure difference, air change rates, and CO2 concentrations in apartment buildings before and after energy retrofits

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Civil Engineering, Research group: Structures and Their Behaviour, Research area: Structural Engineering, Kaunas Univ Technol, Kaunas University of Technology, Dept Enviromn Technol, Natl Inst Hlth & Welf, Finland National Institute for Health & Welfare, Dept Hlth Protect
Authors: Leivo, V., Prasauskas, T., Turunen, M., Kiviste, M., Aaltonen, A., Martuzevicius, D., Haverinen-Shaughnessy, U.
Number of pages: 8
Pages: 85-92
Publication date: 2017
Peer-reviewed: Yes
Publication information
Journal: Building and Environment
There are several ways of arranging rural water supply. One of these is through water cooperatives that have been established to provide water supply, irrigation, and/or sewerage services. Water cooperatives are found in developed countries such as Finland, Denmark, Austria, Canada, and United States, and in developing countries in South America, such as Bolivia and Chile. Water cooperatives or their equivalent organizations that exist in Kenya are called self-help water projects. Yet, surprisingly little attention has been paid to this option even in countries with rich tradition of cooperatives in other sectors. In this study, Finland and Kenya were selected for a comparative analysis of the identified features of water cooperatives. Best practices observed in the features with differences could be shared between the two countries.
Historian hajuista tuoksujen tulevaisuuteen: pääkaupunkiseudun jätevedenpuhdistuksen keskeiset päätökset Espoon näkökulmasta

"From Stinky History to Fragrant Future. Waste water treatment of the metropolitan area - central decisions on the point of view of Espoo. The book examines how water and waste water services started and developed in Espoo from the 1950s to the 2000s. Furthermore, it is discussed what are the challenges of the future looked from the point of view of the professionals of the water sector."

Tässä kirjassa käydään läpi pk-seudun jätevedenkäsittelyn historia ja yhteistyövaiheet aina 1950-luvulta 2010-luvulle asti Espoon näkökulmasta. Tutkimuksen pääkysymyksiä ovat mm.:

– Miksi jätevesien puhdistaminen on keskitetty vain yhteen puhdistamoon?
– Miksi Espoossa tehdään ylikunnallista yhteistyötä jätevesienpuhdistuksessa?
– Miten jätevesien puhdistusyhteistyö on alkanut ja muuttunut vuosien varrella?
– Miksi puhdistetaan naapurikuntien jätevesiä?
– Millaista keskustelua jätevedet ovat herättäneet menneisyydessä ja millaista tulevaisuutta koskevaa keskustelua niistä on käytetty?

ja niiden takana olleet päätökset ovat hyvin kaukonäköisiä ja kaikkia osapuolia sitovia.

Ne osaltaan mahdollistavat, että valittavana on ollut kehityspolkuja, joita kaikkialla ei ole ollut käytössä. Vuoden 2010 alusta alkaen Espoon vesihuolto on toiminut yhdessä pk-seudun organisaatioissa alueen muiden vesilaitosten kanssa, HSY:n organisaation alaisuudessa.

General information
State: Published
Ministry of Education publication type: C1 Separate scientific books
Organisations: Civil Engineering
Authors: Juuti, P.
Number of pages: 280
Publication date: 2017

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Links:

Research output: Scientific - peer-review › Book

Influence of TiO2 compact layer precursor on the performance of perovskite solar cells
The optimization of the hole-blocking layer in perovskite solar cells (PSC), typically based on TiO2, is crucial, as it strongly affects the device performance. In this work, we thoroughly characterize the thickness, roughness, and crystal structure of a set of TiO2 compact layers produced by spin coating of different precursor sols and correlate the choice of the TiO2 precursor to the photovoltaic performance of the PSC. By replacing the commonly used titanium isopropoxide (TTIP) blocking layer precursor with titanium tetrachloride (TiCl4), a clear enhancement in the PSC performance was observed, particularly in the hysteresis behavior and stability. The results from the morphological/structural analysis and transient photoluminescence studies clarify the different behavior of the compact layers in PSCs.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Supramolecular photochemistry, Åbo Akademi, Aalto University, VTT
Pages: 287-293
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ISSN (Print): 1566-1199
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Scopus rating (2015): SJR 1.174 SNIP 1.134 CiteScore 3.6
Scopus rating (2014): SJR 1.36 SNIP 1.203 CiteScore 3.85
Scopus rating (2013): SJR 1.458 SNIP 1.277 CiteScore 3.94
Scopus rating (2012): SJR 1.957 SNIP 1.469 CiteScore 4.25
Scopus rating (2011): SJR 1.932 SNIP 1.468 CiteScore 4.09
Scopus rating (2010): SJR 2.031 SNIP 1.393
Scopus rating (2009): SJR 2.064 SNIP 1.27
Scopus rating (2008): SJR 2.226 SNIP 1.457
Scopus rating (2007): SJR 2.262 SNIP 1.275
Scopus rating (2006): SJR 2.652 SNIP 1.867
Scopus rating (2005): SJR 1.792 SNIP 1.201
Scopus rating (2004): SJR 2.943 SNIP 2.108
Scopus rating (2003): SJR 2.383 SNIP 1.696
Scopus rating (2002): SJR 3.873 SNIP 2.186
Scopus rating (2001): SJR 2.748 SNIP 1.657
Original language: English
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Bibliographical note
EXT="Kaunisto, Kimmo"
Research output: Scientific - peer-review › Article

Kirja-arviointi: Kuinka vesiensuojelu saatiin pääosin pääosin kuntoon?

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Civil Engineering
Authors: Katko, T. S.
Number of pages: 2
Pages: 46-47
Publication date: 2017
Peer-reviewed: No

Publication information
Journal: Vesitalous
Volume: 58
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ISSN (Print): 0505-3838
Original language: Finnish
Research output: Scientific › Article

Modelling of seep through of humidity to electric connector with stochastic processes

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Publication date: 2017
Screening biological methods for laboratory scale stabilization of fine fraction from landfill mining

Abstract

Increasing interest for the landfill mining and the amount of fine fraction (FF) in landfills (40–70% (w/w) of landfill content) mean that sustainable treatment and utilization methods for FF are needed. For this study FF (<20 mm) was mined from a municipal solid waste (MSW) landfill operated from 1967 to 1989. FF, which resembles soil, was stabilized in laboratory scale reactors in two phases: first, anaerobically for 101 days and second, for 72 days using four different methods: anaerobic with the addition of moisture (water) or inoculum (sewage sludge) and aerobic with continuous water washing, with, or without, bulking material. The aim was to evaluate the effect on the stability of mined FF, which has been rarely reported, and to study the quality and quantity of gas and leachate produced during the stabilization experiment.

The study showed that aerobic treatment reduced respiration activity (final values 0.9–1.1 mg O2/g TS) and residual methane potential (1.1 L CH4/kg TS) better than anaerobic methods (1.8–2.3 mg O2/g TS and 1.3–2.4 L CH4/kg TS, respectively). Bulking material mixed in FF in one aerobic reactor had no effect on the stability of FF. The benefit of anaerobic treatment was the production of methane, which could be utilized as energy. Even though the inoculum addition increased methane production from FF about 30%, but the methane production was still relatively low (in total 1.5–1.7 L CH4/kg TS). Continuous water washing was essential to remove leachable organic matter and soluble nutrients from FF, while increasing the volume of leachate collected. In the aerobic treatment, nitrogen was oxidized into nitrite and nitrate and then washed out in the leachate. Both anaerobic and aerobic methods could be used for FF stabilization. The use of FF, in landscaping for example, is possible because its nutrient content (4 g N/kg TS and 1 g P/kg TS) can increase the nutrient content of soil, but this may have limitations due to the possible presence of heavy metal and other contaminants.

General information

State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Civil Engineering
Authors: Juuti, P., Rajala, R.
Number of pages: 3
Pages: 12-14
Publication date: 2017
Peer-reviewed: Yes

Links:
http://www.vesitalous.fi/vesitalous-lehdet/vesien-historia/
Research output: Scientific - peer-review › Review Article

Sata vuotta Suomen suurimmasta lavantautiepidemiasta

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Mönkäre, T. J., Palmroth, M. R. T., Rintala, J. A.
Number of pages: 9
Pages: 739-747
Publication date: 2017
Peer-reviewed: Yes
Service Failures of Rural Water Supply Systems in Ethiopia and Their Policy Implications
As the world is striving to improve water supply coverage, a significant number of rural communities are forced to turn back to unprotected sources due to service breakdowns of their water supply systems. Yet, these communities do not seem to receive the same attention as those building new systems. The purpose of this article is to reveal and diagnose the determinant factors of service failures and to propose mitigation measures to the rural water supply in Ethiopia. The study is conducted through a literature review and field discussions with experts (n = 48) and artisans (n = 35), who have been involved in the implementation, operation, and maintenance of the systems. Moreover, failed schemes (n = 20) were visited, and discussions were held with village elders of each water point. The findings indicate that lack of uniformity of implementation approaches, and institutional and organizational incapability of the local government aggravate the service failures. The further capacity building, institutionalization, and improving remuneration of employees are likely to reduce the problems substantially.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Civil Engineering
Authors: Behailu, B. M., Hukka, J. J., Katko, T. S.
Pages: 179-196
Publication date: 2017
Peer-reviewed: Yes
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Publication information
Journal: Public Works Management & Policy
Volume: 22
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ISSN (Print): 1087-724X
Ratings:
Valkea kaupunki, mustat vedet

General information
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Organisations: Civil Engineering
Authors: Juuti, P., Rajala, R.
Number of pages: 3
Pages: 15-17
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Publication information
Journal: Vesitalous
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Original language: English
Links:
http://www.vesitalous.fi/vesitalous-lehdet/vesien-historia/
Research output: Scientific - peer-review › Review Article

Vesihiulto kaupungistuvissa yhteiskunnissa

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Civil Engineering
Authors: Katko, T. S., Pietilä, P.
Number of pages: 8
Pages: 32-39
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Alue ja Ympäristö
Volume: 46
Issue number: 1
Continuous removal and recovery of tellurium in an upflow anaerobic granular sludge bed reactor

Continuous removal of tellurite (TeO$_3^{2-}$) from synthetic wastewater and subsequent recovery in the form of elemental tellurium was studied in an upflow anaerobic granular sludge bed (UASB) reactor operated at 30 °C. The UASB reactor was inoculated with anaerobic granular sludge and fed with lactate as carbon source and electron donor at an organic loading rate of 0.6 g COD L$^{-1}$ d$^{-1}$. After establishing efficient and stable COD removal, the reactor was fed with 10 mg TeO$_3^{2-}$. L$^{-1}$ for 42 d before increasing the influent concentration to 20 mg TeO$_3^{2-}$. L$^{-1}$. Tellurite removal (98 and 92%, respectively, from 10 and 20 mg Te. L$^{-1}$) was primarily mediated through bioreduction and most of the removed Te was retained in the bioreactor. Characterization using XRD, Raman spectroscopy, SEM-EDX and TEM confirmed association of tellurium with the granular sludge, typically in the form of elemental Te(0) deposits. Furthermore, application of an extracellular polymeric substances (EPS) extraction method to the tellurite reducing sludge recovered up to 78% of the tellurium retained in the granular sludge. This study demonstrates for the first time the application of a UASB reactor for continuous tellurite removal from tellurite-containing wastewater coupled to elemental Te(0) recovery.
The document contains information about the Scopus ratings for various years, along with the original language, keywords, DOIs, and publication details. It also includes a section on indigenous practices of water management for sustainable services, with case studies from Borana and Konso, Ethiopia. The general information includes the state, publication type, organizations involved, authors, number of pages, publication date, and peer-reviewed status. The publication information details the journal, volume, issue, and ISSN. Additional ratings and electronic versions are also provided.
Unipoli Green - Four Universities Working Together for Sustainability

This paper introduces the Finnish context for promoting sustainable development in higher education and describes and analyzes the development of cooperation in Tampere, Finland: its benefits, challenges and limitations. The expectations for universities to promote sustainable development are rising while the resources for sustainability work are scarce. In Tampere there are four universities, Police University College, Tampere University of Applied Science, Tampere University of Technology and University of Tampere, educating and employing over 40,000 people. Promoting sustainability is in different phases at each of these universities. The coordinators of sustainable development in these universities met in spring 2014 and agreed on information sharing and cooperation in the form of concrete events and thematic days. This initiative was supported by the existence of the universities’ cooperation platform UNIPOLI. Later the cooperation has found three major fields: (1) awareness raising, (2) sharing information and influencing management and (3) curriculum development. Possibility of sharing knowledge and experiences and building a community has enabled more efficient actions in all these fields, but the vague mandate of network has caused confusion and hindered realization of some ideas.

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Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Facilities and Infrastructure
Authors: Asikainen, E., Hellman, S., Parjanen, L., Puputti, M., Raatikainen, S., Schroderus, M.
Number of pages: 17
Pages: 257-273
Publication date: 2 Dec 2016

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Research output: Scientific - peer-review › Chapter

Rural Water and Sanitation: Community Managed Project Approach for Sustainability in Ethiopia

Water is a natural need and basic requirement of humankind. Civilization, human settlements, establishments of industry, and locations of agricultural farms have been linked to the presence of water sources. However, the availability of freshwater resources is gradually becoming more challenged by climate change, and service production is being influenced by several factors, including population growth and service breakdowns. A potable water supply for all is unquestionable for enhancing development, education, economies, and social performance. Moreover, sanitation is mandatory for maintaining clean and potable water supply sources. Striving to improve water and sanitation services and focusing on service delivery are fundamental to societies’ overall wellbeing.

The concept of service delivery extends beyond investment in the initial implementations of systems. Instead, it includes sound operation and maintenance of facilities and ensures availability of services throughout the lives of the built systems. Service delivery endeavours are overwhelmed by the implementations of new systems because most of the actors in the sector are actively building new schemes instead of rehabilitating existing ones. Therefore, the tendency in service coverage often means moving two steps forward and one step back because of service failures. To overcome this challenge, the future paradigm should be to intensify the service delivery and make it as important as the implementation of new systems. Stakeholders, particularly user communities, should be involved in every step of the process of implementing the systems that serve them to establish feelings of ownership and to give them active roles during post-construction.

The objective of this study is to obtain insight into service delivery in which the user community is at the centre of service production. It assesses the effects and effectiveness of the Community Managed Project Approach (CMP) in Ethiopia. The study was conducted in the Amhara and Benishangul-Gumuz regions in northwest Ethiopia. These regions were selected because of the presence of CMP and the availability of other implementation approaches for comparison. Data were collected using numerous methods, such as household surveys (n = 1896), focus groups (n = 49), field observations (n = 49), and personal interviews with governmental officials at the district, regional, and federal levels (n = 7). Based on these data, four peer-reviewed journal articles and one international peer-reviewed conference paper were published.
The results of this study indicate that community management is a preferable way to extend water supply and sanitation services in rural areas. The participation of user communities should be managed so that genuine participation leads to feelings of ownership. However, all types of participation (labour, financial, and material contributions) are not always possible to achieve ownership. In some circumstances, the concept of participation might be abused, which might lead to forced involvement. In that case, the dream of community participation might not be realized. Regarding this, CMP has remarkably performed for reaching and involving user communities. To create strong, cohesive, and collective actions, exploring local experiences is crucial. For example, the traditional water management of the Borana and Konso communities in southern Ethiopia are significantly more sustainable than the modern systems built in these areas because of the philosophical differences in management between the community schemes and the introduced schemes.

This study suggests that a wide variety of perspectives on service provision and production should be considered. Community participation should be clearly defined and sensibly implemented. Failure of community participation in the process of building community management might be due to technical experts’ lack of understanding of the reasons that a community should be involved and to citizens’ resistance. Several factors are identified as reasons for frequent service failures in rural water supply, including institutional and social aspects. Therefore, understanding the factors behind the problems, incorporating social capital, and engaging traditional knowledge could improve efforts to sustain service delivery.
The scarcity of non-renewable natural resources and the demand for waste recycling and utilization are steering towards increasing use of waste-derived materials in civil engineering structures. However, as the quality of different waste-derived materials can vary depending on input materials and processes in which they are generated, the utilization of these materials in civil engineering may be risky and cumbersome unless their properties are well-known. In Finland, due to the recently increased number of waste incineration plants, nearly 300 000 t of municipal solid waste incineration bottom ash (MSWI BA) is generated annually in the country. As the material is mainly landfilled or used in landfill site structures at the moment, the utilization of MSWI BA in different civil engineering applications could be increased, if the essential properties of the material were properly understood. In this study, the mechanical properties of recovered MSWI BA were investigated with cyclic load and static triaxial tests. The study focused especially on the influence of changes in moisture content and its relation to the development of recovered MSWI BA stiffness and strength properties over time. The obtained results showed that the stiffness of recovered MSWI BA was highly affected by the changes in moisture content over time but also the material aging had an influence. The resilient modulus, Mr, was at least doubled during the two
months storage of test specimens. Furthermore, when the MSWI BA material dried out and the moisture content decreased 5-7%, the resilient modulus, Mr, of the material was even quadrupled.

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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Civil Engineering, Research area: Earth and Foundation Structures, Research group: Earth Constructions
Authors: Sormunen, L. A., Kolisoja, P.
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Scopus rating (2014): SJR 0.653 SNIP 1.076 CiteScore 1.27
Scopus rating (2013): SJR 0.773 SNIP 0.915 CiteScore 1.1
Scopus rating (2012): SJR 0.495 SNIP 0.574 CiteScore 0.76
Scopus rating (2011): SJR 0.327 SNIP 0.594 CiteScore 0.46
Scopus rating (2010): SJR 0.285 SNIP 0.539
Scopus rating (2009): SJR 0.286 SNIP 0.5
Scopus rating (2008): SJR 0.173 SNIP 0.283
Scopus rating (2007): SJR 0.202 SNIP 0.423
Scopus rating (2006): SJR 0.179 SNIP 0.247
Scopus rating (2005): SJR 0.179 SNIP 0.168
Scopus rating (2004): SJR 0.189 SNIP 0.263
Scopus rating (2003): SJR 0.123 SNIP 0.439
Scopus rating (2002): SJR 0.101 SNIP 0
Scopus rating (2001): SJR 0.131 SNIP 1.125
Original language: English
DOIs:
10.1080/14680629.2016.1251960
Research output: Scientific - peer-review › Article

Methylophilaceae and Hyphomicrobium as target taxonomic groups in monitoring the function of methanol-fed denitrification biofilters in municipal wastewater treatment plants
Molecular monitoring of bacterial communities can explain and predict the stability of bioprocesses in varying physicochemical conditions. To study methanol-fed denitrification biofilters of municipal wastewater treatment plants, bacterial communities of two full-scale biofilters were compared through fingerprinting and sequencing of the 16S rRNA genes. Additionally, 16S rRNA gene fingerprinting was used for 10-week temporal monitoring of the bacterial community in one of the biofilters. Combining the data with previous study results, the family Methylophilaceae and genus Hyphomicrobium were determined as suitable target groups for monitoring. An increase in the relative abundance of Hyphomicrobium-related biomarkers occurred simultaneously with increases in water flow, NO x(-) load, and methanol addition, as well as a higher denitrification rate, although the dominating biomarkers linked to Methylophilaceae showed an opposite pattern. The results indicate that during increased loading, stability of the bioprocess is maintained by selection of more efficient denitrifier populations, and this progress can be analyzed using simple molecular fingerprinting.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry, University of Jyväskylä
Authors: Rissanen, A. J., Ojala, A., Fred, T., Toivonen, J., Tiirola, M.
Pages: 1-13
Publication date: 8 Nov 2016
Peer-reviewed: Yes

Publication information
Application oriented wear testing of wear resistant steels in mining industry

Tampere Wear Center have developed several high-stress wear testers that utilize large sized abrasive particles of natural origin and thus are able to simulate demanding applications of the mining industry. In this work, a versatile high speed slurry-pot wear tester was developed. Research questions studied are: 1) How to set up a wear test method for simulating the real applications?, 2) What are the wear mechanisms in high-stress wear?, and 3) What is the role of microstructure and chemical composition on wear performance of wear resistant steels?

The high speed slurry-pot tester was developed for application oriented erosion wear testing of materials used in mineral handling and processing. It enables tests in demanding high-stress abrasive and erosive environments simulating wear, for example, in slurry pumps, tanks and pipes, dredging, mineral crushing and grinding, screening, loader buckets, and rock drilling. The key design features of the test method are the possibility to use up to 10 millimeter sized large abrasives and sample speeds up to 20 m/s in conditions ranging from wet slurry environments to dry sand or gravel.

The work has been done in FIMECC DEMAPP and DIMECC BSA projects, the focus is in the application oriented wear testing of materials intended for demanding wear related applications.
Elimination of arsenic-containing emissions from gasification of chromated copper arsenate wood

The behavior of arsenic in chromated copper arsenate containing wood during gasification was modeled using thermodynamic equilibrium calculations. The results of the model were validated using bench-scale gasification tests. It is shown that over 99.6% of arsenic can be removed from the product gas by a hot filter when the gas is cooled below the predicted condensation temperature.
Methylophaga and Hyphomicrobium can be used as target genera in monitoring saline water methanol-utilizing denitrification

Which bacterial taxonomic groups can be used in monitoring saline water methanol-utilizing denitrification and whether nitrate is transformed into N2 in the process are unclear. Therefore, methylotrophic bacterial communities of two efficiently functioning (nitrate/nitrite reduction was 63–96 %) tropical and cool seawater reactors at a public aquarium were investigated with clone library analysis and 454 pyrosequencing of the 16S rRNA genes. Transformation of nitrate into N2 was confirmed using 15N labeling in incubation of carrier material from the tropical reactor. Combining the data with previous study results, Methylophaga and Hyphomicrobium were determined to be suitable target genera for monitoring the function of saline water methanol-fed denitrification systems. However, monitoring was not possible at the single species level. Interestingly, potential nitrate-reducing methylotrophs within Filomicrobium and closely related Fil I and Fil II clusters were detected in the reactors suggesting that they also contributed to methylotrophic denitrification in the saline environment.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Rissanen, A. J., Ojala, A., Dernjatin, M., Jaakkola, J., Tiirila, M.
Pages: 1-11
Publication date: 1 Oct 2016
Peer-reviewed: Yes
Comparison of community managed projects and conventional approaches in rural water supply of Ethiopia

This study aimed to compare Community Managed Projects (CMP) approach with the conventional approaches (Non-CMP) in the case of Ethiopia. The data collection methods include a household survey (n=1806), community representative interviews (n=49), focus group discussions with district water experts (n=48) and observations of water systems (n=49). The data were collected from seven districts of two regions of Ethiopia. The study shows that CMP have a better platform to involve the community than non-CMP. In terms of reducing distances to water points, all approaches succeeded. However, the intended amount of water supplied is not achieved in all the cases: only 25% of CMP users and 18% of non-CMP users are able to get water according to the national standard, 15 L per capita per day. Fee collection in the approaches has a high disparity in favour of CMP. To keep long-lasting services, three requirements need to be particularly fulfilled: quantity, quality and accessibility.

Sustainable nutrients recovery and recycling by optimizing the chemical addition sequence for struvite precipitation from raw swine slurries

Livestock farming contributes heavily to nitrogen (N) and phosphorus (P) flows into the environment, a major cause of eutrophication of coastal and freshwater systems. Furthermore, the growing demand for N-P fertilizers is increasing the emission of anthropogenic reactive N into the atmosphere and the depletion of the current P reserves. Therefore, it is essential to minimize the anthropogenic impact on the environment and recycle the wasted N-P for agricultural reuse. This study focused on enhancing struvite (MgNH4PO4*6H2O) precipitation from raw swine slurries in batch and laboratory-scale reactors. Different chemical addition sequences were evaluated, and the best removal efficiency (E%) was obtained when the chemicals were mixed before the precipitation process. Struvite was detected at a pH as low as 6 (E%N-P∼50%), and high E%N-P was found at pH 7–9.5 (80–95%). Furthermore, air stripping was used in place of NaOH to adjust pH, returning the same efficiency as if only alkali had been used. XRD and FE-SEM analysis of the precipitate showed that the recovered struvite was of high purity with orthorhombic crystalline structure and only trace amounts of impurities from matrix organics, co-precipitation products (CaO and amorphous calcium-phosphates), and residuals of added chemicals (MgO).
Rakennusten energiankulutuksen perusskenaario Suomessa 2015-2050
Ilmaston lämpenemistä aiheuttavista kasvihuonekaasupäästöistä noin 80 % on peräisin energian tuotannosta ja kulutuksesta (ml. liikenne), mikä tarkoittaa, että energia- ja ilmastostrategiat ovat tiiviis kokonaisuus. Vuonna 2016 Suomessa valmisteltiin uutta energia- ja ilmastostrategiaa, johon kuuluu myös skenaarioiden valmistelu. Tässä raportissa esiteltiin strategia skenaariojen valmistelutyössä. Raportti jakaantuu kahteen osaan: rakennustyypit ja perusskenaariota koskeneen tulevien tasa- ja kasvutilastojen tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat ja tulevat 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Recent advances in nutrient removal and recovery in biological and bioelectrochemical systems

Nitrogen and phosphorous are key pollutants in wastewater to be removed and recovered for sustainable development. Traditionally, nitrogen removal is practiced through energy intensive biological nitrification and denitrification entailing a major cost in wastewater treatment. Recent innovations in nitrogen removal aim at reducing energy requirements and recovering ammonium nitrogen. Bioelectrochemical systems (BES) are promising for recovering ammonium nitrogen from nitrogen rich waste streams (urine, digester liquor, swine liquor, and landfill leachate) profitably. Phosphorus is removed from the wastewater in the form of polyphosphate granules by polyphosphate accumulating organisms. Alternatively, phosphorous is removed/recovered as Fe-P or struvite through chemical precipitation (iron or magnesium dosing). In this article, recent advances in nutrients removal from wastewater coupled to recovery are presented by applying a waste biorefinery concept. Potential capabilities of BES in recovering nitrogen and phosphorous are reviewed to spur future investigations towards development of nutrient recovery biotechnologies.
Combining mineral fractions of recovered MSWI bottom ash: improvement for utilization in civil engineering structures

In real-life construction projects, the utilization of different types of waste derived aggregates can often be falsely considered as utilization, but in fact, it is merely dumping the potentially high value material from one site to another. For example, building highway noise barriers with waste derived aggregates cannot be considered as utilization. In this study, a more advanced approach was chosen in order to create aggregate like products from recovered municipal solid waste incineration (MSWI) bottom ash (BA) and thus potentially increase their value and image in civil engineering applications. MSWI BA from one waste incineration plant in Finland was first treated with a Dutch dry treatment technology called ADR (Advanced Dry Recovery). This process separates non-ferrous and ferrous metals from MSWI BA and generates mineral fractions of different grain sizes. These mineral fractions may not be used separately, for example, in the unbound structural layers of roads due to the strict grain size distribution requirements of these civil engineering structures. Hence, different combinations were designed from these BA mineral fractions using the mathematical proportioning of aggregates. The aim was to create aggregate like products from this waste material for different structural layers (filtration, sub-base and base) of, for example, road and field structures. Three mixtures were chosen based on their correspondence to the grain size distribution requirements of natural aggregates and further analyzed in the laboratory from their technical, mechanical and environmental point of view. The leaching of chrome (Cr) and chloride (Cl-) exceeded the Finnish emission boundary values for utilization of certain types of ashes in civil engineering. On the other hand, the technical and mechanical properties of these mixed bottom ash products were considered suitable to be used, for example, in the unbound structural layers of the interim storage field in a waste treatment center. In such location, also the leaching potential of harmful substances can be further studied and verified in a larger scale.

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Glazed spaces: A simplified calculation method for the evaluation of energy savings and interior temperatures

Previous studies have shown that temperatures inside glazed balconies are almost without exception higher than those of outside air. This is due to the space's ability to capture and store the building's heat losses and solar radiation. The interior temperatures and energy saving effects of glazed balconies are, however, not particularly good in Finland, because the implemented solutions are not optimized for these issues. The purpose of this study is to introduce simplified evaluation methods for the energy saving and interior air temperature evaluation of glazed spaces and to verify the method reliably with the help of measured and simulated values of typical Finnish 1970s apartment blocks. The presented method can be used for optimizing and showing the energy saving impact as well as the mean, maximum and minimum temperatures of different type of glazed spaces in the preliminary design stage. The results show that the accuracy of the method is sufficient for designing if nine parameters are changed at most. The accuracy is affected by the number of changes made in relation to the typical 1970s apartment blocks in Finland, which was chosen as a starting point for the method's development.
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Authors: Hilliaho, K., Kovalainen, V., Huuhka, S., Lahdensivu, J.
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A laboratory listening experiment on subjective and objective rating of impact sound insulation of concrete floors

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A method for design of sound insulation of glazed balconies against traffic noise

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Effect of particle size and dispersion status on cytotoxicity and genotoxicity of zinc oxide in human bronchial epithelial cells

Data available on the genotoxicity of zinc oxide (ZnO) nanoparticles (NPs) are controversial. Here, we examined the effects of particle size and dispersion status on the cytotoxicity and genotoxicity of nanosized and fine ZnO, in the presence and absence of bovine serum albumin (BSA; 0.06%) in human bronchial epithelial BEAS-2B cells. Dynamic light scattering analysis showed the most homogenous dispersions in water alone for nanosized ZnO and in water with BSA for fine ZnO. After a 48-h treatment, both types of ZnO were cytotoxic within a similar, narrow dose range (1.5-3.0 μg/cm²) and induced micronuclei at a near toxic dose range (1.25-1.75 μg/cm²), both with and without BSA. In the comet assay, nanosized ZnO (1.25-1.5 μg/cm²), in the absence of BSA, caused a statistically significant increase in DNA damage after 3-h and 6-h treatments, while fine ZnO did not. Our findings may be explained by better uptake or faster intracellular dissolution of nanosized ZnO without BSA during short treatments (3-6 h; the comet assay), with less differences between the two ZnO forms after longer treatments (>48 h; the in vitro micronucleus test). As ZnO is genotoxic within a narrow dose range partly overlapping with cytotoxic doses, small experimental differences e.g. in the dispersion of ZnO particles may have a substantial effect on the genotoxicity of the nominal doses added to the cell culture.

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Authors: Roszak, J., Catalán, J., Järventaus, H., Lindberg, H. K., Suhonen, S., Vippola, M., Stepnik, M., Norppa, H.
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Hydrothermal carbonization of pulp mill streams

The progress of the conversion, the yield, the structure and the morphology of the produced carbonaceous materials as a function of time were systematically studied with pyrolysis-GC/FID and FESEM microscope. The conversion of galactoglucomannan, bleached kraft pulp and TEMPO oxidized cellulose nanofibrils followed the reaction route of glucose being slower though with fibrous material, higher molar mass and viscosity. The conversion of kraft lignin was minor following completely different reaction route. Carbonaceous particles of different shape and size were produced with yields between 23% and 73% after 4 h with being higher for lignin than carbohydrates. According to the results, potential pulp mill streams represent lignocellulosic resources for generation of carbonaceous materials.

General information

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Scopus rating (2010): SJR 2.086 SNIP 2.355
Scopus rating (2009): SJR 1.912 SNIP 2.231
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The utilisation of municipal solid waste incineration bottom ash has been extensively studied, for example, in the unbound layers of roads and the products of cement and concrete industry. On the other hand, less attention has been given to other innovative utilisation possibilities, such as using the municipal solid waste incineration bottom ash as a component in growing media of plants. The municipal solid waste incineration bottom ash contains useful substances, such as calcium, that can influence plant growth in a positive manner. Therefore, the utilisation of this waste-derived material in the growing media may substitute the use of commercial fertilisers. Since the municipal solid waste incineration bottom ash also contains hazardous substances that can be toxic to plants, the main aim of this study was to add different amounts of recovered municipal solid waste incineration bottom ash in the growing media and to evaluate the effect of this material on plant growth. Based on the obtained results, the concentration of, for example copper and zinc, increased in test plants; ryegrass and barley, when recovered municipal solid waste incineration bottom ash was added in their growing media. On the other hand, this did not have a significant effect on plant growth, if compared with the growth of plants in commercially produced growing medium. Furthermore, the replacement of natural sand with municipal solid waste incineration bottom ash had a positive liming effect in the growing media. Overall, these findings suggest that the utilisation of recovered municipal solid waste incineration bottom ash as a component in growing media is possible and, thus, may allow more widespread and innovative use of this waste-derived material.

Innovative use of recovered municipal solid waste incineration bottom ash as a component in growing media

The utilisation of municipal solid waste incineration bottom ash has been extensively studied, for example, in the unbound layers of roads and the products of cement and concrete industry. On the other hand, less attention has been given to other innovative utilisation possibilities, such as using the municipal solid waste incineration bottom ash as a component in growing media of plants. The municipal solid waste incineration bottom ash contains useful substances, such as calcium, that can influence plant growth in a positive manner. Therefore, the utilisation of this waste-derived material in the growing media may substitute the use of commercial fertilisers. Since the municipal solid waste incineration bottom ash also contains hazardous substances that can be toxic to plants, the main aim of this study was to add different amounts of recovered municipal solid waste incineration bottom ash in the growing media and to evaluate the effect of this material on plant growth. Based on the obtained results, the concentration of, for example copper and zinc, increased in test plants; ryegrass and barley, when recovered municipal solid waste incineration bottom ash was added in their growing media. On the other hand, this did not have a significant effect on plant growth, if compared with the growth of plants in commercially produced growing medium. Furthermore, the replacement of natural sand with municipal solid waste incineration bottom ash had a positive liming effect in the growing media. Overall, these findings suggest that the utilisation of recovered municipal solid waste incineration bottom ash as a component in growing media is possible and, thus, may allow more widespread and innovative use of this waste-derived material.
Negotiating Groundwater Governance: Lessons from Contentious Aquifer Recharge Projects

Groundwater is an invaluable part of our natural, built, and socio-economic environments. In global context, groundwater is the largest freshwater resource: almost half of all drinking water is abstracted from underground. During the last few decades, Finnish community water supply has increasingly relied on natural and artificially recharged groundwater as raw water source. Currently, their combined share of the water supplied is some 66 percent, out of which 16 percent is artificially recharged. However, potential groundwater areas and places for groundwater recharge are sparsely situated. Thus, large city centres, with their increasing need for fresh water supply, are obliged to withdraw groundwater from afar, often crossing municipal borders. This may cause tensions between different jurisdictional units; generally, between rural and urban areas. This research illustrates how cooperation between municipalities can turn into a conflict. Indeed, there are several examples of local conflicts around the inter-municipal groundwater projects in Finland. Many projects which are justified on both technical and economic grounds have problems in gaining legitimacy among local inhabitants. Oppositions emerge and projects may go through long litigation processes.

A contentious groundwater project can be classified as a complex management problem: it is unpredictable, uncontrollable, and it has several, often contradictory interpretations. Therefore, conventional groundwater management approaches, drawing from expert-based instrumental rationality, often are insufficient for successful project planning and implementation. Indeed, the emerging paradigm emphasizes collaborative approaches to complex management problems in the fields of natural resources management as well as urban planning. Water services (water supply, wastewater treatment, and storm water management) are inherently bound to these fields through their multiple connections with aquatic environment, required technical infrastructures, and influence on socio-economic development.

The main objective of this study was to find new perspectives for groundwater governance by analysing contentious cases that operate in field of water services, thus connecting the contexts of natural resources management and urban planning. Accordingly, the research problem was formulated as follows: Which are the major constraints in large scale groundwater projects from the perspective of collaborative governance, and what lessons can be drawn for future collaboration?

The research problem was addressed through negotiation theory and discursive framework which adhere to social constructionist tradition. Through these theoretical and methodological considerations, this study enclosed conflict analysis and discourse analysis. These methods were exploited in a comprehensive analysis of the two case studies where inter-municipal water supply projects, based on the managed aquifer recharge (MAR) technology, were contested by local inhabitants. First case is situated to southwestern coastal area of Turku Region. It started already in the 1970s as a long-distance water transfer project, and was finalized in 2010 when an MAR plant started to operate on the esker of Virttaankangas. However, the other case, situated to Tampere Region, started in 1993, and the process is still unfinished.

The results of this study indicate that the water management sector is strongly grounded on instrumental rationality when solely expert knowledge is considered as a legitimate source of information. Accordingly, planning and management of the MAR projects concentrated mainly on the visible tip of an iceberg, instead of managing the whole. The interaction between parties was based on competitive mindset and zero-sum game; thus, the underlying interests and the complexity of the project were not recognized. Strong positions were taken, which precluded the possibility of finding mutual gains.

Although cases involved some collaborative efforts, they were used only as casual tools without really relying on collaborative rationality. However, in groundwater governance it should be other way round: the core should be in collaborative rationality while some of the tools can be obtained from rationalistic expert-based planning. Thus, legitimacy for the project should be gained through joint knowledge production as well as interaction, where addressing stakeholders' interests instead of predefined goals could help in finding mutual gains and creative new options for collaboration. Furthermore, in this process, water managers and experts should be more like facilitators than holders of the only legitimate source of knowledge and the stakeholders like partners rather than informants or adversaries.
Ravinnevisio: Selvitys Pirkanmaan puhdistamolietteiden ja biojätteiden ravinteista ja niiden potentiaalisesta käytöstä

The effect of climate change on freeze-thaw durability of concrete structures in Finland

Lahdensivu presented in his Doctoral Thesis (Durability Properties and Actual Deterioration of Finnish Concrete Facades and Balconies, 2012) that without proper air-entrainment outdoor concrete structures have needed average of 307 freeze-thaw cycles (threshold value: t ≤ -5 °C) after a rain event in southern Finland and 388 cycles in inland for incipient freeze-thaw damage to occur. The difference between figures can be explained by the greater amount of wind-driven rain (WDR) before the freeze-thaw cycle on coastal areas.

As a consequence of climate change it has been shown that by the end of the century, the amount of WDR is going to increase 30 % at southern Finland and 40 % at inland. At the same time the amount of freeze-thaw cycles after a rain event are decreasing significantly at both locations which indicates freeze-thaw durability-wise longer service life for outdoor concrete structures. However, the latest studies show that while the amount of freeze-thaw cycles is decreasing, the amount of WDR before the cycles is also increasing significantly.

The WDR at winter time in Finland is highly orientated on west to south-east directions which can be seen also by the degradation rate observations of concrete facades and balconies based on condition assessments. In this study, the changes at WDR before the freeze-thaw events and the effect of climate change on them depending on the structure orientation are calculated to estimate the changes of climatic stress level on outdoor concrete structures.
Deterioration mechanisms and life cycle of concrete monoblock railway sleepers in Finnish conditions

Thirty eight sleepers aged 30 to 40 years old were removed from Finnish railway lines and were loaded. Twelve new sleepers were also tested. The old sleepers fulfilled most of the requirements specified for the new ones. The old sleepers were also much more resistant to loading than predicted by structural calculations. The purpose of field tests was to establish the role of traffic loads in the life-cycle of sleepers: the actual stresses and moments in sleepers due to traffic loads; the distribution of the load through the underside of the sleeper to the ballast; and the variation in ballast-sleeper reaction on different sections of track in different seasons. Strain changes at the top surfaces of sleepers were measured on tracks while the rail was loaded by passing trains. Ballast-sleeper reactions tended to be concentrated under the rail along a length of sleeper of approximately 350 mm towards the centre of the track. The mean bending moments determined at the rail seat and centre of sleepers were about ±2.5 kNm, and the maximum moments were up to ±10 kNm. The purpose of fatigue loading tests was to analyse the long term properties of the sleepers and the effect of fatigue on the stiffness of sleepers. Several load levels were chosen in order to estimate the significance of the fatigue in a real operating situation. The fatigue limit determined based on the loading tests and the computational limit state of crack formation were clearly higher than the bending moments measured in the field tests.

Parameters Affecting the Upcycling of Waste Cotton and PES/CO Textiles

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Paradigman jäljillä: Tutkimus vesihuollon ajattelumalleista

The municipalities of Finland are facing interesting times; the public sector as a whole is struggling with economic and productivity challenges and is striving to find innovative development strategies for the future. The prevailing conditions are reflected in the built environment, in the technical sector of municipalities and, therefore, in infrastructure services such as water services. Generally speaking, water services are perceived to be static in nature that have operated successfully in the relatively unchanging conditions of history. However, the increasing complexity and faster rate of change in the operating environment are forcing water services to be more innovative and able to explore their own role as a part of variety of systems as well as to formulate problems accordingly. The way water services are thought and seen ultimately defines what kind of solutions are produced and services delivered. Thinking patterns related to water services shape its future.

These thinking patterns – the paradigms of water services – are in the spotlight in this doctoral dissertation. For this purpose, the conceptual framework of two alternative paradigms of water services is constructed. Paradigm 1 represents a production-oriented world view that rests on reductionist thinking, production-based value creation logic, and closed-context expertise. Paradigm 2 embodies a service-oriented world view that is based on holistic systems thinking, service-based value creation logic, and open-context expertise. Based on this conceptual framework, the four selected research articles are explored, following the principles of qualitative research. The purpose is to find and clarify the paradigm related clues of the articles, and hence approach the question: how are water services thought?

The theme of the first article relates to the relationships between water utilities and external service providers. It shows that the relationships are based on mistrust that must be managed by continuously tightening contracts. As a consequence of the dominant paradigm, there is no foothold left for building trust between parties. The second article highlights the identity of water services by asking what kind of meanings water utilities place on water services. Reflecting the findings in relation to the paradigms, it is seen that the aim of water services is perceived to be the realization of top-down imposed goals. This explains why sense-making with wider systemic meanings hardly occurs. The theme of the third article relates to the idea of inverse infrastructure, which refers to user[IV] driven developed infrastructures that have the characteristics of self-organization and volunteerism. These kinds of alternative infrastructure solutions shift the power of decision away from formal systems, hence this tendency is not necessarily favoured in the municipal infrastructure policy.

In the light of paradigm exploration, municipal infrastructure policy should be enabling and integrative. The theme of the fourth article, in turn, deals with social norms. It is argued that following social norms over sectoral boundaries has an effect on trust and acceptance towards the water services.
Regarding all four articles, this study revealed that, along with material and quantitative dimensions, there resides invisible system dimensions affecting the service that is ultimately provided. If water services are perceived by a production-oriented paradigm, these less obvious system dimensions are ignored or formulated in an inappropriate manner. A service-oriented paradigm is, in turn, more responsive to different system dimensions; it also emphasizes that the less obvious phenomena can have an influence on the service as a whole. From the research that has been carried out, it can be concluded that if the purpose of water services is to create well-being for the wider society, then there seems to be a need for a paradigm shift that puts more consideration on the changing and ever more complex operating environment. In that case, the ways water services are thought and understood have to change towards a world view outlined by the service-oriented paradigm. It helps to rediscover the linkage between the water services and societal development.

**General information**

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Organisations: Department of Chemistry and Bioengineering

Authors: Heino, O.

Number of pages: 111

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**Effect of heavy metal co-contaminants on selenite bioreduction by anaerobic granular sludge**

This study investigated bioreduction of selenite by anaerobic granular sludge in the presence of heavy metals and analyzed the fate of the bioreduced selenium and the heavy metals. Selenite bioreduction was not significantly inhibited in the presence of Pb(II) and Zn(II). More than 92% of 79 mg/L selenite was removed by bioreduction even in the presence of 150 mg/L of Pb(II) or 400 mg/L of Zn(II). In contrast, only 65-48% selenite was bioreduced in the presence of 150-400 mg/L Cd(II). Formation of elemental selenium or selenide varied with heavy metal type and concentration. Notably, the majority of the bioreduced selenium (70-90% in the presence of Pb and Zn, 50-70% in the presence of Cd) and heavy metals (80-90% of Pb and Zn, 60-80% of Cd) were associated with the granular sludge. The results have implications in the treatment of selenium wastewaters and biogenesis of metal selenides.

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry, UPEM, Bhabha Atomic Research Centre, Environmental Engineering and Water Technology Department, UNESCO-IHE Institute for Water Education

Authors: Mal, J., Nancharaiah, Y. V., van Hullebusch, E. D., Lens, P. N. L.

Number of pages: 8

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Scopus rating (2015): SJR 2.255 SNIP 1.908 CiteScore 5.47
Access to Water? Dynamic Capacity Change for Sustainable Rural Water and Sanitation Services for All

The lack of adequate safe drinking-water together with poor sanitation and hygiene imposes an extremely high disease burden on millions of children and adults. This compromises well-being and productivity, and aggravates the cycle of poverty. Cultivating capacity for change is an important element of practically every policy reform, development programme, and country strategy aiming to improve well-being of its citizens, and with it also, e.g., water services and sanitation. The purpose of this dissertation was to recommend ways for rural water and sanitation sector specific programmes and projects to inspire capacity change for continued learning, adaptation, and innovation in the face of ever-new challenges in a volatile and unpredictable local and global environment, while the system in itself was assumed to be complex and wicked already at the present time.

The specific objective was to develop futures-oriented frame of reference that can be applied for policy, programme, and project purposes. It draws from a wide range of action research the author has been involved with in Nepal, Guyana, Tanzania, and Bangladesh. It consists of six international peer-reviewed scientific articles and three case studies. The approach is constructivist and actor-oriented, it pays attention to agency and institutions, is plural rather than singular, differentiating rather than generalizing. The frame of reference is based on three analytical levels: 1) individual, 2) organizational/institutional, and 3) enabling environment.

Rural water sector must pay attention to rural livelihoods and cross-sectoral issues to truly benefit rural development and well-being. This can be done through the multiple-use water services paradigm, adding ecological sanitation. Two of the articles studied a bi-lateral water project in Nepal that combined water supply, sanitation, irrigation, and hydro-energy with livelihoods, small cottage industries and micro-finance (cooperatives) within one project operating through local government. Conceptually and policy-wise complex system translated into tangible benefits and positive impacts in the poorest and remotest corners of Nepal once the enabling environment was conducive to allow this. It proved out to be a useful instrument for making change happen, empowering communities and encouraging continuous learning, innovation, and adaptation. Empowerment is here defined as group's or individuals' capacity to make effective choices and then transform these choices into desired actions and outcomes and with these, into services and benefits.

Capacity related interventions need to have a vision that goes further than just the present state of affairs. Appreciating the complexity and dynamic nature of the rural water sector, the system should not be split into individual components or activities, such as individual training courses or narrow mandates that do not consider the broader framework within which they must operate and change.

The 'capacity cube' in this dissertation represents the 'present' that moves across its different dimensions simultaneously and is in constant change in time. Framing the 'cube' allows the project or programme planners to establish the external layers of reference to give shape for the time dimension, the expected results ('services'), the external and internal drivers and barriers to change in terms of enabling environment, and the institutions and humans therein. Among others, it recommended to further study scale application of multiple use water services with ecological sanitation in the livelihoods context and the rural water service delivery paradigm.
HPLC-SEC: a new approach to characterise complex wastewater effluents

This work investigates the use of HPLC-SEC to characterise dissolved organic matter (DOM) of complex wastewater effluents. A silica-based column, sodium acetate eluent and multiple detections were employed: UV-254 absorbance for humic-type, and tryptophan-like (Ex/Em = 270/355) and tyrosine-like (Ex/Em = 270/310) fluorescence for protein type compounds. Effects of eluent pH, eluent ionic strength and injection volume on separation efficiency were tested. Humic-type and protein-type fractions were clearly differentiated and eluted within and out of calibration range. Eluent ionic strength had the greatest influence on global resolution; the lowest eluent concentration of 0.01 M produced the best separation for all wastewater effluents tested at any detection. UV-254 absorbance was higher at neutral and basic eluent pH while tryptophan-like fluorescence depended on the sample composition rather than on the eluent pH or ionic strength. Tyrosine-like fluorescence decreased significantly with the increase of eluent ionic strength. Accurate molecular weight measurements could not be done, the separation being influenced by secondary interactions, but could be approximated using separate calibrations with sodium salts of polystyrene-sulfonates and protein standards. The results show that this method is suitable for determining DOM in wastewater at low eluent concentrations (up to 0.03 M), at neutral or slightly basic pH.
Planning land use for biogas energy crop production: The potential of cutaway peat production lands

Each year, thousands of hectares of peatland that had been harvested are being released in Finland, which can offer an opportunity to increase energy crops and attain the bioenergy targets for non-agriculture lands. In this study, the Geographic Information System (GIS) method was used to improve the assessment of decentralized renewable energy resources. The amount of peat production lands and future cutaway areas for energy crop production was calculated as a case study by using ArcGIS and the Finnish Topographic database. There are almost 1000 km² of peat production lands in Finland, and theoretically, approximately 300 km² of cutaway peatlands could be used for energy crops after 30 years. The dry biomass yield of reed canary grass (Phalaris arundinacea) or timothy-fescue grass (mix of Phleum pratense and Festuca pratensis) could be higher than 100 Gg a⁻¹ in these lands indicating methane potential of approximately 300 GWh. The exhausted peat production areas in the western region of Finland have significant potential for use for energy crops; North and South Ostrobothnia account for almost 45% of the total peat production land. A future goal could be to use the cutaway peat production lands more efficiently for bioenergy to mitigate climate change. Since the use of wastelands (including peatlands) are being considered in Europe as a way to avoid competition with food production, the GIS method used in the study to identify suitable peat lands could be applicable to biomass resource studies being conducted in many countries.
Plasma-Assisted Fabrication of Fe2O3 - Co3O4 Nanomaterials as Anodes for Photoelectrochemical Water Splitting

Nanocomposite Fe2O3-Co3O4 photoanodes for photoelectrochemical H2O splitting were prepared by a plasma-assisted route. Specifically, Fe2O3 nanostructures were grown by plasma enhanced-chemical vapor deposition, followed by cobalt sputtering for different process durations. The systems were annealed in air after, or both prior and after, sputtering of Co, to analyze the treatment influence on functional performances. The interplay between processing conditions and chemico-physical features was investigated by a multi-technique characterization. Photocurrent density measurements in sunlight-assisted H2O splitting revealed a performance improvement upon Co3O4 loading. A cathodic shift of the onset potential was also observed, highlighting Co3O4 activity as catalyst for the oxygen evolution reaction.
Microbial electrochemical technologies with the perspective of harnessing bioenergy: Maneuvering towards upscaling

Microbial electrochemical technologies have gained much attention in the recent years during which basic research has been carried out to provide proof of concept by utilizing microorganisms for generating bioenergy in an electro redox active environment. However, these bio-electrocatalyzed systems pose significant challenges towards up-scaling and practical applications. Various parameters viz., electrodes, materials, configuration, biocatalyst, reaction kinetics, fabrication and operational costs, resistance for electron transfer etc. will critically govern the performance of microbial catalyzed electrochemical systems. Majorly, the surface area of electrode materials, biofilm coverage on the electrode surface, enrichment of electrochemically active electrode respiring bacteria and reduction reactions at cathode will aid in increasing the reaction kinetics towards the upscaling of microbial electrochemical technologies. Enrichment of electroactive microbial community on anode electrode can be promoted with electrode pretreatment, controlled anode potential or electrical current, external resistance, optimal operation temperature, chemical additions and bioaugmentation. Inhibition of the growth of methanogens also increases the columbic efficiency, an essential parameter that determines the efficacy of bioelectricity generation. Considering the practical implementation of these microbial electrochemical technologies, the current review addresses the challenges and strategies to improve the performance of bio-electrocatalyzed systems with respect to the operational, physico-chemical and biological factors towards scale up. Besides, the feasibility for long term operation, the scope for future research along with the operational and maintenance costs are discussed to provide a broad spectrum on the role of the system components for the implementation of these bio-electrochemical technologies for practical utility.
Accelerated deactivation studies of the natural-gas oxidation catalyst—Verifying the role of sulfur and elevated temperature in catalyst aging

Accelerated deactivation, caused by thermal aging (TA) and/or sulfur+water poisoning (SW), of the PtPd/γ-Al2O3 natural-gas oxidation catalyst was studied. Thermal aging and poisoning treatments were performed separately and with varied combinations and comprehensive characterization of the catalyst was carried out after each step. The fresh catalyst has small, oxidized PtPd particles (<5nm) uniformly distributed in the γ-alumina washcoat. After the SW-treatment, a small amount of bulk aluminum sulfate was observed near the slightly grown noble metal particles. During the thermal aging, γ-alumina changed to δ-/θ- and α-alumina. In addition, total decomposition of oxidized Pt and partly decomposition of oxidized Pd occurred resulting in the formation of the grown noble metal particles. During the thermal aging, γ-alumina changed to δ-/θ- and α-alumina. In addition, total decomposition of oxidized Pt and partly decomposition of oxidized Pd occurred resulting in the formation of the grown noble metal particles. After the SW-treatment, a small amount of bulk aluminum sulfate was detected and it was randomly distributed over the noble metal particles and washcoat. The activity in the terms of methane conversion over the TA-, SW-, and SW+TA-treated catalysts was similar but it was decreased compared to the fresh catalyst. The activity of the TA+SW-treated catalyst was drastically decreased compared to the fresh catalyst due to significant morphological changes and aluminum sulfate formation.

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Research group: Materials Characterization, University of Oulu, Aalto University, Chalmers University of Technology, Dinex Ecocat Oy
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Peer-reviewed: Yes
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Publication information
A study on raw, torrefied, and steam-exploded wood: Fine grinding, drop-tube reactor combustion tests in N₂/O₂ and CO₂/O₂ atmospheres, particle geometry analysis, and numerical kinetics modeling

The purpose of this study was to compare the fine grinding properties and combustion behavior of three wood pellet products: raw, torrefied, and steam-exploded wood. The energy required to fine grind the pellets was tested, and so was the geometry and size distribution of the resulting ground products. Out of all the samples the steam-exploded wood pellet required the most energy for grinding. However, it also produced more sphere-like particles compared to the other two types of samples. The combustion behavior of the samples was tested in a laminar drop-tube reactor (DTR). The samples were preground and the particles were sieved with vibration sieves with an opening of 112–125 μm. The pyrolysis process was examined separately at a temperature range of 973–1173 K. The combined pyrolysis and combustion tests were carried out at a reactor temperature of 1123 K. The O₂ concentrations used in the measurements were 3–21 vol-% in either N₂ or CO₂ atmospheres. The initial size distribution of the sample particles as well as their diameter evolution during pyrolysis and combustion was studied by using optical techniques. The surface temperature of the combusting particles was measured with a two-color pyrometer from within the DTR. The density, specific surface area, and pore
diameter were measured from the ground samples with a mercury porosimeter. The chemical kinetic parameters, which describe the pyrolysis and char oxidation rates of the samples, were determined by using the data from the measurements.

Characterization of fine fraction mined from two Finnish landfills
A fine fraction (FF) was mined from two Finnish municipal solid waste (MSW) landfills in Kuopio (1- to 10-year-old, referred as new landfill) and Lohja (24- to 40-year-old, referred as old landfill) in order to characterize FF. In Kuopio the FF (<20mm) was on average 45±7% of the content of landfill and in Lohja 58±11%. Sieving showed that 86.5±5.7% of the FF was smaller than 11.2mm and the fraction resembled soil. The total solids (TS) content was 46-82%, being lower in the bottom layers compared to the middle layers. The organic matter content (measured as volatile solids, VS) and the biochemical methane potential (BMP) of FF were lower in the old landfill (VS/TS 12.8±7.1% and BMP 5.8±3.4 m³ CH₄/t TS) than in the new landfill (VS/TS 21.3±4.3% and BMP 14.4±9.9 m³ CH₄/t TS), and both were lower compared with fresh MSW. In the Kuopio landfill materials were also mechanically sieved in the full scale plant in two size fraction <30mm (VS/TS 31.1% and 32.9 m³ CH₄/t TS) and 30-70mm (VS/TS 50.8% and BMP 78.5 m³ CH₄/t TS). The nitrogen (3.5±2.0g/kg TS), phosphorus (<1.0-1.5g/kg TS) and soluble chemical oxygen demand (COD) (2.77±1.77kg/t TS) contents were low in all samples. Since FF is major fraction of the content of landfill, the characterization of FF is important to find possible methods for using or disposing FF mined from landfills.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Power Plant and Combustion Technology
Authors: Tolvanen, H., Keipi, T., Raiko, R.
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Peer-reviewed: Yes

Publication information
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Scopus rating (2016): CiteScore 4.9 SJR 1.744 SNIP 2.179
Scopus rating (2015): SJR 1.809 SNIP 2.125 CiteScore 4.46
Scopus rating (2014): SJR 1.667 SNIP 2.331 CiteScore 4.14
Scopus rating (2013): SJR 1.811 SNIP 2.595 CiteScore 4.31
Scopus rating (2012): SJR 1.852 SNIP 2.465 CiteScore 3.99
Scopus rating (2011): SJR 2.093 SNIP 2.427 CiteScore 4.1
Scopus rating (2010): SJR 1.984 SNIP 2.319
Scopus rating (2009): SJR 2.012 SNIP 2.277
Scopus rating (2008): SJR 1.635 SNIP 2.184
Scopus rating (2007): SJR 1.383 SNIP 1.86
Scopus rating (2006): SJR 1.278 SNIP 1.64
Scopus rating (2005): SJR 1.623 SNIP 1.73
Scopus rating (2004): SJR 1.273 SNIP 1.883
Scopus rating (2003): SJR 1.103 SNIP 1.481
Scopus rating (2002): SJR 1.13 SNIP 1.301
Scopus rating (2001): SJR 1.136 SNIP 1.264
Scopus rating (2000): SJR 1.047 SNIP 1.272
Scopus rating (1999): SJR 1.117 SNIP 1.157
Original language: English
Keywords: Combustion, Biomass, Chemical kinetics, Carbon dioxide, Drop-tube reactor
DOIs:
10.1016/j.fuel.2016.02.071
Research output: Scientific - peer-review › Article
To decrease the use of non-renewable natural resources as well as environmental effects of earth-works, natural aggregate materials can be replaced with recycled materials acquired from surplus soil, industrial by-products and waste, etc. When wishing to increase the usage of these reclaimed materials (="UUMA"-material), the usage must be straightforward for developers, designers and constructors alike. To make this possible, the materials must have design guidelines for their appropriate applications. They must be productized and CE marked or otherwise authorized, and the construction guidelines for the materials must be included in the Finnish general specifications for infrastructural construction works (InfraRYL). As productization is especially important in increasing the usage of UUMA materials, guidelines for vendors are being drawn that present information on commercializing reclaimed materials to be used in earthworks. The guidelines for productization are being prepared in the Finnish national UUMA2 programme (2013-2017, www.uuma2.fi), which was created to promote the use of recycled materials in earthworks.

Commercialising reclaimed materials in earthworks – guidelines for productization and the process of appending these materials in the Finnish national code of practice

To decrease the use of non-renewable natural resources as well as environmental effects of earth-works, natural aggregate materials can be replaced with recycled materials acquired from surplus soil, industrial by-products and waste, etc. When wishing to increase the usage of these reclaimed materials (="UUMA"-material), the usage must be straightforward for developers, designers and constructors alike. To make this possible, the materials must have design guidelines for their appropriate applications. They must be productized and CE marked or otherwise authorized, and the construction guidelines for the materials must be included in the Finnish general specifications for infrastructural construction works (InfraRYL). As productization is especially important in increasing the usage of UUMA materials, guidelines for vendors are being drawn that present information on commercializing reclaimed materials to be used in earthworks. The guidelines for productization are being prepared in the Finnish national UUMA2 programme (2013-2017, www.uuma2.fi), which was created to promote the use of recycled materials in earthworks.
High rate autotrophic denitrification in fluidized-bed biofilm reactors

High rate, high efficiency thiosulfate-driven autotrophic denitrification and denitrification with Thiobacillus denitrificans dominated biofilms were achieved in fluidized-bed reactors (FBRs) operated at 20.0 ± 2.0 and 30.0 ± 0.2 °C. Complete nitrate removal was obtained even at nitrate loading rate and hydraulic retention time (HRT) of 600 mg L⁻¹ h⁻¹ and 10 min, respectively. Further decrease of HRT to 5 min resulted in 50% of nitrate removal efficiency. Nitrite did not accumulate when nitrate was used as electron acceptor unless HRT was decreased to 5 min. Effluent pH remained at 5.8 during denitrification. When nitrite was supplemented as the electron acceptor, denitrification effectively proceeded with the highest nitrite loading rate of 228 mg L⁻¹ h⁻¹. Similar denitrification and denitrification performances were obtained at 20.0 ± 2.0 and 30.0 ± 0.2 °C. Batch assays conducted at temperature range from 1 to 46 °C, however, showed a significant impact of temperature on autotrophic denitrification. Ratkowsky model was used to estimate the minimum, optimal and maximum growth temperatures of T. denitrificans dominated culture that were below 1, 26.6 and 50.8 °C, respectively.

General information
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Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Zou, G., Papirio, S., Lakaniemi, A., Ahoranta, S., Puhakka, J.
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Scopus rating (2016): CiteScore 6.34 SJR 1.745 SNIP 1.933
Scopus rating (2015): SJR 1.695 SNIP 1.919 CiteScore 5.68
Scopus rating (2014): SJR 1.703 SNIP 1.981 CiteScore 4.92
Scopus rating (2013): SJR 1.602 SNIP 1.914 CiteScore 4.59
Scopus rating (2012): SJR 1.517 SNIP 1.85 CiteScore 3.92
Scopus rating (2011): SJR 1.39 SNIP 1.762 CiteScore 3.96
Scopus rating (2010): SJR 1.243 SNIP 1.526
Scopus rating (2009): SJR 1.109 SNIP 1.498
Scopus rating (2008): SJR 1.056 SNIP 1.513
Scopus rating (2007): SJR 1.121 SNIP 1.52
Scopus rating (2006): SJR 0.982 SNIP 1.251
Scopus rating (2005): SJR 1.113 SNIP 1.482
Scopus rating (2004): SJR 0.916 SNIP 1.39
Scopus rating (2003): SJR 0.848 SNIP 1.109
Scopus rating (2002): SJR 0.692 SNIP 0.983
Scopus rating (2001): SJR 0.672 SNIP 0.854
Scopus rating (2000): SJR 0.611 SNIP 0.738
Scopus rating (1999): SJR 0.391 SNIP 0.805
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Research output: Scientific - peer-review › Article
Institutional development is the key for sustainable water services in the built environment

General information
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Organisations: Department of Civil Engineering
Authors: Katko, T. S., Hukka, J. J.
Number of pages: 12
Pages: 419-430
Publication date: 2016

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Title of host publication: Proceedings of the CIB World Building Congress 2016 : Volume IV - Understanding impacts and functioning of different solutions
Place of publication: Tampere
Publisher: Tampere University of Technology. Department of Civil Engineering
Editors: Nenonen, S., Junnonen, J.
Links:
Research output: Scientific - peer-review › Conference contribution

Learning for sustainable water and sanitation services

General information
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Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Chemistry and Bioengineering
Authors: Takala, A.
Pages: 250-258
Publication date: 2016

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Publisher: Instituut voor Duurzame Ontwikkeling vzw
Editor: Mazijn, B.
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ISBN (Electronic): 978-90-903-0131-0
Links:
Research output: Scientific - peer-review › Conference contribution

Modeling of Finnish building sector energy consumption and greenhouse gas emission: specification of POLIREM policy scenario model

Monitoring needs have increased in recent years, and answers to various questions related to the energy use of the building stock are needed faster than before. POLIREM model is a calculation model that assesses the effect of different policy scenarios on the Finnish building stock. The model determines the energy consumption and greenhouse gas emissions, and its purpose is to assist in the reporting and scenario work. The model has a strong linkage with the statistical data, and a top-down approach, which makes the POLIREM different from previous bottom-up style building stock models.

The POLIREM model was originally developed at the Tampere University of Technology in MS excel environment. In this work, the model was converted into a coded version that ensures flexible scenario building, including ease of updating the input data, as well as enabling further integration of new features and/or data sources. This report provides a technical specification of the python-coded scenario model POLIREM.

This report is part of development work to establish national reporting system/evaluation scheme, and fulfils requirements for openness by describing transparently the used evaluation method for building stock modelling.

General information
Modelling of anisotropic fatigue
A continuum approach for anisotropic fatigue is described. The approach is based on the idea of a moving endurance surface in the stress space where the movement is described by a back-stress type tensor. The evolution associated with the movement is described by a rate type equation. In addition, damage accumulation is governed by a rate type evolution equation, thus facilitating its use under arbitrary complex loading conditions. The main emphasis of this paper is to discuss the possible forms of the endurance surface and pertinent evolution equations to model high-cycle anisotropic fatigue. Suggestions towards a unified model capturing the low-cycle regime are also given.

Modelling of plastic culvert and road embankment interaction in 3D
A series of 3D Finite Element simulations was performed to investigate the effect of different factors influencing the distortions undergone by a plastic culvert tube while subject to external loading from a heavy truck. The applied simulation model was verified by full-scale loading tests carried out on a number of actual culvert installation sites. Based on the results of the study, it can be concluded that both installation depth and quality of the material surrounding the culvert have a dominant effect on culvert distortions while the effects of material quality above the culvert and the type of tyre configuration transmitting the wheel load are much less pronounced.
Need of Services and Understanding of Service Providers in Water and Sanitation: A Case of Ethiopia

Water and sanitation services are basic requirements for the development of a nation. The provision of these services should necessarily be arranged by the national government through policies, and long-term and short-term plans. Moreover, follow-up of the implementation of principle in policies and plans will determine the service level on the ground. This paper is intended to explore gaps in the policy-making and implementation in the areas of water supply in Ethiopia. Review of Ethiopian water sector policy, universal access plans, growth and transformation plans and other literature are employed to achieve the objective of this paper. Moreover, the experiences of the first author that he acquired during data collection for his doctoral study are taken into account to draw conclusions. Hence, the study shows that standards set at the federal level fail to consider the actual situation on the ground and the experts at implementation level are to interpret some aspects of the policy ambiguously. Therefore, this paper recommends the policy-makers and higher officials to consult the people in charge of putting policies in effect to have contextualized and work for uniform desired output. Service providers need to understand the notion of the receiving community in order to provide the services that satisfy the users.

General information
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Scopus rating (2014): SJR 0.275 SNIP 0.679 CiteScore 0.53
Scopus rating (2013): SJR 0.217 SNIP 0.464 CiteScore 0.4
Scopus rating (2012): SJR 0.191 SNIP 0.396 CiteScore 0.28
Scopus rating (2011): SJR 0.237 SNIP 0.586 CiteScore 0.45
Scopus rating (2010): SJR 0.219 SNIP 0.434
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Electronic versions:
Kolisoja & Kalliainen Procedia Engineering Copy
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Links:
http://urn.fi/URN:NBN:fi:tty-201608164416
Research output: Scientific - peer-review › Article

Need of Services and Understanding of Service Providers in Water and Sanitation: A Case of Ethiopia

Water and sanitation services are basic requirements for the development of a nation. The provision of these services should necessarily be arranged by the national government through policies, and long-term and short-term plans. Moreover, follow-up of the implementation of principle in policies and plans will determine the service level on the ground. This paper is intended to explore gaps in the policy-making and implementation in the areas of water supply in Ethiopia. Review of Ethiopian water sector policy, universal access plans, growth and transformation plans and other literature are employed to achieve the objective of this paper. Moreover, the experiences of the first author that he acquired during data collection for his doctoral study are taken into account to draw conclusions. Hence, the study shows that standards set at the federal level fail to consider the actual situation on the ground and the experts at implementation level are to interpret some aspects of the policy ambiguously. Therefore, this paper recommends the policy-makers and higher officials to consult the people in charge of putting policies in effect to have contextualized and work for uniform desired output. Service providers need to understand the notion of the receiving community in order to provide the services that satisfy the users.

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Authors: Behailu, B. M., Mattila, H.
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Publisher: Tampere University of Technology
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Pohjoismaiden energiapoliittika 2030: Hiilineutraalimpaan energiajärjestelmään osin yhdessä, osin eri polkuja pitkän

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%20hiilineutraalimpaan%20energialailla%202030%20-%20energialailla%202030%20.pdf
Research output: Professional › Discussion paper

Preferential adsorption of Cu in a multi-metal mixture onto biogenic elemental selenium nanoparticles
Preferential adsorption of Cu contained in wastewaters is desirable as the Cu can then be reprocessed and reused more easily. In this study, biogenic elemental selenium nanoparticles (BioSeNPs) were assessed for their ability to preferentially adsorb Cu from an equimolar mixture containing Cu, Cd and Zn. Variations in metal to BioSeNPs ratios and initial metal solution pH improved the preferential adsorption capacity of BioSeNPs toward Cu, with the ratio of Cu adsorbed to combined Cd and Zn adsorbed varying from 2.3 to 6.6. More than 78% of the added Cu was adsorbed at an initial metal solution pH of 5.2 and metal to BioSeNPs ratio of 0.21mg mg⁻¹ when the ratio of Cu adsorbed to the sum of Cd and Zn adsorbed was 2.3. Infrared spectroscopy revealed that the Cu, Cd and Zn were interacting with the hydroxyl and carboxyl surface functional groups of the BioSeNPs. The modeling of BioSeNPs' acid-base titration revealed the presence of high concentrations of carboxylic groups (C=60.3mol kg⁻¹) with a pKₐ of 3.9, providing further evidence of their interaction with Cu. The adsorption of Cu resulted in a lower colloidal stability of the BioSeNPs as indicated by more than 99% retention of added BioSeNPs after adsorption of heavy metals and filtration. BioSeNPs showed a good preferential adsorption capacity toward Cu as compared to other adsorbent. This study provides a proof-of-concept for the preferential adsorption of Cu onto BioSeNPs which are present in the effluent of a bioreactor treating selenium oxyanions containing wastewater.
Lignocellulosic biomass has been considered as an important and sustainable source of renewable energy. Cellulose constitutes the major component of the lignocellulosic biomass and also offers maximum recalcitrance towards its fullest utilization. The enzymatic breakdown of cellulose is achieved through cellulases. Diverse forms of microbes including fungi, bacteria, actinomycetes and yeast are known to produce cellulases that have found extensive application in various industries. Due to the current global political unrest over oil prices and the threat of global warming following combustion of fossil fuels, the paradigm of research is now focused on biofuel production from plant biomass. Conventional approaches have not been economically feasible for meeting the demands of the industry. This review provides an update regarding the status of present microbial cellulase production technologies and research with special reference to solid state fermentation and different molecular techniques such as mutagenesis, metabolic engineering and heterologous gene expression of cellulases from different microbial domains with improved catalytic and stability properties. Metagenomic and genomic studies for mining of novel cellulase genes in addition to screening of culturable strains using conventional methods have been advanced. In addition the bottlenecks associated with cellulase production and how the future research needs to be directed to provide a comprehensive technology for the production of cellulases with novel traits for application at an industrial level without economic constraints are discussed.
Sorption of zinc onto elemental selenium nanoparticles immobilized in Phanerochaete chrysosporium pellets

The use of a novel hybrid biosorbent, elemental selenium nanoparticles (nSe\(^0\)) immobilized in pellets of Phanerochaete chrysosporium, to remove Zn from aqueous solutions was investigated. Fungal pellets containing nSe\(^0\) (nSe\(^0\)-pellets) showed to be better biosorbents as they removed more Zn (88.1 ± 5.3 %) compared to Se-free fungal pellets (56.2 ± 2.8 %) at pH 4.5 and an initial Zn concentration of 10 mg L\(^{-1}\). The enhanced sorption capacity of nSe\(^0\)-pellets was attributed to a higher concentration of sorption sites resulting in a more negative surface charge density, as determined by analysis of the potentiometric titration data. Fourier transform infrared spectroscopy (FT-IR) analysis of fungal pellets prior to and after being loaded with Zn showed the functional groups, including hydroxyl and carboxyl groups, involved in the sorption process. The experimental data indicated that the sorption rate of the nSe\(^0\)-pellets fitted well to the pseudo-second order kinetic model (\(R^2 = 0.99\)), and the sorption isotherm was best represented by the Sips model (Langmuir-Freundlich) with heterogeneous factor \(n = 1\) (\(R^2 = 0.99\)), which is equivalent to the Langmuir model. Operational advantages of fungal pellet reactors and the Zn removal efficiencies achieved by nSe\(^0\)-pellets under mild acidic conditions make nSe\(^0\)-pellet based bioreactors an efficient biosorption process.
Tammikuun tehopiikki – mitä tapahtui 7.1.2016? Miten tehoa hallitaan paremmin jatkossa?

Teräsrumppujen uudet korjausmenetelmät: Halkaistu sisäputki, puolipohjaus ja pohjan betonointi

Tässä tutkimuksessa arvioitiin uudentyyppisten korjausmenetelmien soveltuvuutta teräksestä valmistetun rummun käyttöajan pidentämiseksi. Tutkimuksessa rajaauduttiin tarkastelemaan sellaisia korjausmenetelmiä, joita käyttämällä rumpuputken aukon koko pienenee mahdollisimman vähän. Rummun korjaaminen on kannattavinta kohteissa, joissa rummun asennuspyynnöt ovat suuri eikä tien aukonlaatu aiheuta suuret liikenteenjärjestelykustannukset.

Tutkimuksessa on tarkasteltu kolmea uutta menetelmiä: halkaistu sisäputki, puolipohjaus ja pohjan betonointi. Näistä kahdesta ensimmäisestä kokeilijat vahvistivat sen, että pohjan betonointimenetelmän avulla voidaan saavuttaa parempia tuloksia. Pohjan betonointimenetelmän avulla on mahdollista saavuttaa suuremmat menetelmiin käytettävän materiaalin säästöt.
melko pieni.

Aiemmissa rumpuputken mekaanisen toiminnan mallinnuksissa käytetty PLAXIS 3D-ohjelmiston rinnalla mallinnettiin tässä tutkimuksessa rumpuputkeen syntyviä rasituksia tarkemmin myös ANSYS-ohjelmistolla. Tämän osalta todettiin, että korjatun rumpuputken mekaanista käyttäytymistä ei saatu verifioitua uskottaviksi arvioidulla materiaaliparametreilla. Suurin yksittäinen laskennallista virhettä aiheuttava tekijä oli ANSYS-ohjelmistossa käytössä ollut materiaalimalli, joka mahdollisti vettöjännitysten syntymisen sitomattomien tien rakennuskerroksien täkkämystä vaikuttaen tärkeänä tekijänä suurena, ja myös rumpun yläpintaa rasittava puristusjännitys jää laskennamallejaan liian pieneksi. Tulevia korjausratkaisuja ei siis tutkimuksen tulosten perusteella pystytä verifioimaan pelkästään laskennallista virhettä aiheuttavissa materiaalimallissa rakennuskerrosten ja pohjamaan osalta. Näin ollen laskennallisten parametrien määrittämisen tueksi tarvitaan tarkempia tietoja joko rumpuputken käyttäytymisestä tai rumpa ympäröivistä maakerroksista.

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Authors: Kalliainen, A., Haakana, V., Korhonen, M., Mäkinen, J., Kolisoja, P.

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**Vesihuollon strateginen kehittäminen haltuun: Ydin- ja tukitoiminnon tarpeen hahmottaa selkeästi**

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Production of Oleaginous Microbial Biomass by Reusing Wastewaters

Global energy demand continues to increase, which raises the question regarding how to solve the energy crisis caused by diminishing fossil fuels. There is no single alternative energy source that could substitute the fossil fuels, but microbial single cell oils (SCO) could be part of the solution. SCOs can be produced by cultivating microorganisms in wastewater in which nutrients and carbon from the wastewater are used for biomass production. In optimized conditions, microorganisms begin to accumulate lipids, and these lipids can be further refined for the production of biodiesel or renewable diesel. The lipid accumulation of the microorganisms may be enhanced by culturing the microorganisms under stressful conditions. The most commonly used strategy for enhancing lipid accumulation is nitrogen starvation, but it is even more effective when combined with another stress factor, such as moderately increased salinity. In microbial lipid production, the major cost factor is often the substrate needed for the microorganisms. Therefore, utilizing inexpensive substrates and waste materials for the cultivation of oleaginous microorganisms is very desirable. Various wastewaters from municipalities, agriculture, and industrial sources have been studied, and many of these wastewaters have shown the potential for lipid-rich biomass production. Unfortunately, most of the studies have been conducted using sterilized wastewater. In large-scale applications, the sterilization of the wastewater is not cost-effective; therefore, lipid-accumulating microorganisms able to compete with the indigenous microorganisms of the wastewater need to be further studied. The aim of this work was to sustainably produce oleaginous biomass by reusing the carbon and nutrients from wastewaters. This work included an evaluation of the suitability of various wastewaters for lipid-rich biomass production (Paper I), the isolation of yeasts and fungi, which could possibly accumulate lipids by utilizing wastewater as substrate (Paper II), and the determination of the ability of the isolated microorganisms to accumulate lipids by comparing them with known lipid accumulating yeasts (Paper II). Unlike yeasts and fungi, microalgae are able to use an inorganic carbon source for their growth. This feature enables the combination of wastewater and flue gas treatment. Therefore, the growth and lipid accumulation of three microalgal species were compared (Paper III), and the suitability of the most potential microalgal species for accumulating lipids in sterilized and non-sterilized wastewater was studied (Paper III & IV). Based on the results of this study, palm oil mill effluent (POME) has more potential for lipid production than chemithermomechanical pulp mill effluent (CTMP) or municipal wastewater (MWW) (Paper I). The residual lipids and solids of POME obstructed the analyses of the microbial SCOs. Eukaryotes isolated from POME with agar plates were genetically identified as Candida silvae NRRL Y-6725 (with 100% similarity), Galactomyces geotrichum LMA-20 (with 99.8% similarity), Lecythophora hoffmannii CBS245.38T (with 96.7% similarity), and Graphium penicillioides JCM9300 (with 99.3% similarity) (Paper II). The fungus Graphium penicillioides had a great potential for lipid accumulation based on the comparison study with well-known oleaginous yeast strains (Yarrowia lipolytica DSMZ8212, Cryptococcus curvatus DSMZ70022, & Cryptococcus albidus DSMZ701097) in a synthetic medium (Paper II). The lipid content per dry weight was higher with G. penicillioides compared to C. curvatus after 15 days of incubation (29.1±3.0 wt% vs 20.2±2.9 wt%, Paper II). Unfortunately, the overall lipid concentration was lower due to a lower biomass concentration. G. penicillioides contained more than 20% lipids, so it can be called oleaginous. From the three microalgae isolated from a Taiwanese freshwater area (Chlorella sorokiniana CY1, Chlorella vulgaris CY5, & Chlamydomonas sp. JSC-04), C. vulgaris accumulated more lipids when various media, nitrogen sources, and nitrogen concentrations were studied (Paper III). The C. vulgaris in the BG-11 medium, initially containing 0.38 g NaNO3/L, produced 3.8 g/L biomass and 57.5 wt% lipids after 12 days of incubation. The most suitable wastewater dilution for the lipid accumulation of C. vulgaris on sterilized anaerobically treated piggery wastewater was 5x dilution, which resulted in initial chemical oxygen demand and total Kjeldahl nitrogen of 75.4 mg/L and 57.4 mg/L, respectively. C. vulgaris was suitable for accumulating lipids on both sterilized and non-sterilized anaerobically treated piggery wastewater (PW) (Paper IV). The highest lipid content and productivity with the non-sterilized wastewater were rather promising (32.5±3.2 wt%, 71.2±2.2 g/L/d). However, under the conditions of these experiments, C. vulgaris excreted dissolved organic carbon (Paper III & IV), and the aim in wastewater treatment is the removal of organic carbon. In summary, this work demonstrates the potential of indigenous eukaryotic microorganisms for lipid-rich biomass production. G. penicillioides isolated from POME has the potential for lipid-rich biomass production in a synthetic medium, which has not been previously reported. Similarly, C. vulgaris has the potential for lipid-rich biomass production in non-sterilized piggery wastewater, while most of the studies in the literature on C. vulgaris and wastewater have been conducted using sterilized wastewater. To enable simultaneous accumulation of lipids and efficient treatment of wastewater, special attention should be focused on the growth conditions.

**General information**

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**Organisations:** Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry

**Authors:** Marjakangas, J.

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Heap Bioleaching of Low-grade Multimetal Sulphidic Ore in Boreal Conditions

The bioleaching of metal sulphide ore has developed into an important industrial process to recover valuable base metals from low-grade ores, because high grade ore resources are depleting. The Talvivaara deposits in Finland have been known for decades, but have not been utilized until now, because of the low nickel concentration. The aim of this work was to study the bioleaching process of a Finnish complex multimetal black schist ore in boreal conditions. The effects of pH and leaching temperature on the dissolution of valuable metals and gangue minerals were studied. The effect of low temperature on iron oxidation and mineral bioleaching was investigated. Microbial community development at different pH values and temperatures was tested in laboratory-scale bioleaching columns and finally the community dynamics were studied in a demonstration-scale bioheap over a period of three years in Talvivaara Finland.

The experiments were carried out using laboratory-scale columns containing about 9 kg of agglomerated ore. The columns were loaded with the ore, irrigated with pregnant leaching solution (PLS) by recycling and aerated from the bottom. The tested pH range was from 1.5 to 3.0 at 21 ºC and temperature range was from 7 to 50 ºC at pH 2.5. The particle size (d80) of the ore was 7.6 mm. Surface water taken from lake near the Sotkamo deposit (slightly affected by acid mine drainage) supplemented with nutrients was used for irrigation. Aeration was provided through a diffuser inserted at the base of the column. The iron- and sulphur-oxidizing bacterial culture used in inoculation of the columns, was enriched from surface water samples (pH 4.5-6.9) obtained from the ore deposit. The pH of irrigation solution was maintained with continuous titration with H2SO4. The ore was acid consuming in all tested conditions. The actual pH of the irrigation solutions after 140 days were 0.1-0.5 units over the target values in all columns. Leaching at low pH resulted in increased acid consumption of 160 and 38 H2SO4 g kg-1 ore at pH 1.5 and 2.0 after 140 days. Temperature, at pH 2.5, had also effect on acid consumption. At 50 ºC acid consumption was highest and lowest at 21 ºC, being 29 and 8 H2SO4 g kg-1 ore, respectively.

The pH of the irrigation solution clearly affected to the dissolution of nickel and zinc. Nickel solubilization rate was 3.3 times higher at pH 1.5 than at pH 3.0, being 0.42 and 0.13 % (Ni) d-1, respectively. At pH 1.5 valuable metals yields were 59 % for Ni, 52 % for Zn, 13 % for Cu and 16 % for Co, whereas at pH 3.0 yields were 15 % for Ni, 10 % for Zn, 0.5 % for Cu and 6 % for Co after 140 days of bioleaching. No significant bioleaching happened after that at pH 1.5, 2.5 or 3.0. At pH 2.0 the maximum yields were achieved after 230 days of bioleaching. Nickel and zinc leaching rates and yields decreased nearly linearly as pH increased. Copper did not bioleach at high pH (2.5-3.0). After the beginning, no further cobalt dissolution happened at pH 3.0. Decrease in leaching rates may be due to a lack of dissolved ferric iron, serving as a leaching agent, or metal dissolution barriers created by precipitates on the ore surfaces. The ferric iron concentration in PLS increased all the time at pH 1.5, being 36 g l-1 after 140 days. At pH 2.0 the ferric iron concentrations varied, being highest 3.8 g l-1 after 97 days. At 2.5 and 3.0 no ferric iron was present in PLS and iron concentration remained low, being 15 mg l-1.

After 60 days of bioleaching the leach liquor at pH 1.5 became jelly-like due to solubilization of Si from the ore, which contained 42 % (w w-1) of SiO2. Quartz, phlogopite, and feldspars (anorthite and microcline) were the main Si-containing phases. After 110 days the Si concentration reached 2.96 g L-1 at pH 1.5. Soluble Si increases the solution viscosity and thus hinders leach liquor percolation trough the heap, lowers the oxygen transfer rate, and complicates subsequent metal extraction. Although, dissolved Si did not affect the solubilization of valuable metals, the pH value of the PLS must be kept at over 1.5 to slow down Si-containing mineral dissolution. At pH 2.5 less than 200 mg L-1 Si was solubilized and different temperatures had no effect on Si dissolution at that pH.

Based on an optimisation between the maximum valuable metal yields, leaching rates, the acid consumption, and the low
Temperature strongly affected the valuable metal yields at pH 2.5. Leaching at low temperature (7 ºC) resulted in yields of 24 % for Ni, 17 % for Zn, 2 % for Cu and 6 % for Co after 496 days. The Cu leaching increased all the time during the experiment at 7 ºC, while at other temperatures it slowed down after 100 days. The highest yields were obtained at 21 ºC (26 % for Ni, 18 % for Zn, 0.5 % for Cu and 6 % for Co) after 153 days. After re-inoculation (day 65) with a thermophilic Sulfolobus culture, leaching at 50 ºC accelerated but slowed down soon and resulted in 18 % for Ni, 11 for Zn, 0.3% for Cu and 2% for Co (after 140 days). In the column leaching study, after the maximum yields, longer leaching time did not result more metals in solutions.

After 50 days of bioleaching, at 7 ºC leach liquor total cell counts (108-109 cells mL-1) were significantly higher than at other temperatures (106-107 cells mL-1). Cell counts remained that high throughout the column study. At the end of the experiment, total cell counts in the leach residues were studied. At 7, 21, 35 and 50 ºC cell counts of the leach residues were 3.4·108, 2.3·108, 1.1·107 and 8.7·106 cells ore g-1, respectively. The pH did not affect at 21 ºC the numbers of microorganisms in the PLS and cell counts remained at 106-108 cell mL-1 throughout the study and the leach residues contained about 106 cells g ore-1.

The microbial community composition and dynamics was by investigated by DNA extraction PCR-DGGE-sequencing approach. The microbial community were not affected by pH. In contrast, temperature affected the microbial populations. After the first months, Acidithiobacillus ferrooxidans AP 310 (96-99% sequence similarity, accession DQ35518) was the only species detected at 7 ºC and was also present at other temperatures. After the data of this study was published (2007), two new Acidithiobacillus species were described, A. ferrivorans and A. ferridurans. Genetically these species are very near each other. The 16S rRNA gene sequences of the bands that corresponded 99% of A. ferrooxidans AP310 (DQ35518) were identified again in 2015 using the basic local alignment search tool (BLAST). The 16S rRNA gene sequences of A. ferrooxidans at temperatures of 7 and 21 ºC corresponded 99% as A. ferrooxidans SS3 (CP002985). One of the 16S rRNA gene sequences of A. ferrooxidans strains at 35 ºC corresponded 99% as A. ferrooxidans ATCC 3302 (NR_117036). At 50 ºC, no proper A. ferrooxidans 16S rRNA gene sequences were gained with the used methods. The presence of A. ferrooxidans at 50 ºC was concluded based on the fact that the DGGE band was in the same place as the other A. ferrooxidans bands. The 16S rRNA gene sequences of Acidithiobacillus ferrooxidans strains in pH between 1.5 and 3.0, at 21 ºC, corresponded also 99% as A. ferrivorans SS3 (CP002985). In the light of increased knowledge, these species cannot be separated with the denaturing approach of 40 to 70% that were used in the DGGE. A. ferrooxidans, A. ferrivorans and A. ferridurans are able to oxidize both iron and sulphur compounds.

Leptospirillum ferrooxidans DSM 2705 (98-100%, X86776) and Sulfobacillus thermotolerans KR-1 (99%, DQ124681) were mainly detected at 21 ºC and 35 ºC. Sb. thermotolerans was present at 50 ºC. L. ferrophilum D1 (99 %, DQ665909) appeared after 300 days of bioleaching and was present in every leach residue, except at 7 ºC and pH 3.0. L. ferrooxidans and L. ferrophilum are able to oxidize only iron. Sb. thermotolerans is able to oxidize both iron and sulphur compounds.

Archaeal species were analyzed two times from leach liquors and three species were detected. A species related to an uncultured archaeon clone ant b7 (99%, DQ303249), nearest known species Thermoplasma acidiphilum DSM1728 (91%, AL445067) was present in all of the leach liquors except at pH 1.5. Archaea related to Sulfolobus metallicus DSM 6482 (98%, SM16SRRN1) were present at pH values 2.5 and 3.0 and in all other temperatures, except at 7 ºC. Sulfolobus metallicus is able to oxidize both iron and sulphur compounds. Ferroplasma acidiphilum DR1 (98%, AY222042) that can oxidize only iron, was present at pH 2.5 and 2.0, and in all temperatures, expect at 35 ºC.

The mixed iron- and sulphur-oxidizing culture in the recirculation solution at 7 ºC was used in the experiments where Fe2+-oxidation rate and optimum temperature were determined over a temperature range of 2-40 ºC. Two temperature optima of 22.4 ºC and 32.4 ºC were observed. This indicated the presence of both psychrotolerant and/ or mesophilic microorganisms in the culture. This supports the suggestion that A. ferrooxidans was actually A. ferrivorans, or both species were present. The specific oxidation rates for the culture were similar, with 13.5·10-8 and 12.8·10-8 mg Fe2+ cell-1 h-1 for 22.4 ºC and 32.4 ºC, respectively.

The two demonstration-scale bioheaps (17 000 t) at the Talvivaara mine site were operated and monitored by Talvivaara Mining Company for 30 months. After the start-up of heap irrigation, oxidation of pyrrhotite and pyrite increased the heap temperature in central locations up to 90 ºC. In the second winter temperatures inside the heaps decreased being still 80
°C at the hottest spots. Leach liquor temperatures varied between 60 °C and 15 °C over the whole operation period. The target pH of the PLS was 2.0. Inspite of continuous titration pH varied during the 10 months between 3.5 and 3.0 and after that between 3.0 and 2.5.

The bacterial community composition on the heaps was monitored over time from manholes and the leach liquor collection ponds. At the end of the primary bioleach phase (18 months) cell counts were around 10^6 cells mL^-1. Large temperature gradients resulted in the simultaneous presence of mesophilic and thermophilic iron- and sulphur-oxidisers in the heap. In the beginning diversity was broad, but decreased with time. A. ferrooxidans/ ferrivorans SS3 (99%, CP002985) was the dominant bacterium and an unknown bacterium related to clone H70 (91%, DQ328625) was present. After six months of bioheap operation L. ferrooxidans DSM 2705 (98%, X86776) was observed for the first time and it was present thereafter in nearly all samples. Archaea were analysed during the primary leaching phase from leach liquors. Two novel archaea and one archaea related to Thermoplasma acidophilum strain 122-1B2 (91%, NR_028235) were detected.

Several ore samples were drilled from the primary bioheaps after one year of bioheap operation. A. ferrooxidans/ A. ferrivorans SS3 (99%, CP002985) was present in nearly all samples. The novel bacterium related to clone H70 (91%, DQ328625) and A. caldus related bacteria (95%, AY427958) was detected from the areas of wide temperature variation. Sb. thermosulfidooxidans strain YN22 (99%, DQ650351) was found from the high temperature zones of the heap. Ferrimicrobium acidiphilum T23 (99%, AF251436) was present in the areas where temperature varied between 20 and 35 °C. After 18 months of demonstration-scale heap operation, the heaps were reclaimed and restacked to the secondary bioheap. At the secondary leaching phase the community remained steady. A. ferrooxidans/ ferrivorans SS3 (99%, CP002985) dominated and the novel bacterium related to a clone H70 (91%, DQ328625) and L. ferrooxidans DSM 2705 (98-100%, X86776) were present in the leach liquors of secondary phase bioheaps.

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Research output: Collection of articles > Doctoral Thesis

Simultaneous nutrient removal and lipid production with Chlorella vulgaris on sterilized and non-sterilized anaerobically pretreated piggery wastewater
Piggy wastewater is a potent nutrient source for microalgal lipid production. Wastewater has been usually sterilized when used for microalgae cultivation. This is uneconomical in large-scale applications. Therefore, lipid productivity of Chlorella vulgaris CY5 using sterilized and non-sterilized diluted anaerobically pretreated piggery wastewater was studied in batch reactors. The maximum average lipid productivity was obtained after 12 days of incubation and it was higher with the sterilized wastewater than with the non-sterilized one (117g/L/d vs. 91.3g/L/d), due to the higher biomass concentration. Because of the unexpected increase of dissolved organic carbon (DOC) in the cultures, second experiment was conducted to characterize the composition of produced DOC in non-sterilized wastewater. Carbohydrate content increased in the liquid phase but decreased in the biomass after nitrogen had been exhausted. After 12 days of incubation, soluble chemical oxygen demand (COD) was 414±56mg/L, biomass production was 2.8±0.15g/L, and lipid content was 30.3±1.2wt%. Average lipid productivity from day zero to day 12 was 70.5±1.1g/L/d. C. vulgaris removed nutrients from the non-sterilized wastewater and produced oleaginous biomass, although the lipid productivity was higher with sterilized wastewater.
Airtightness of residential buildings in Finland

Single-family buildings and apartments in multi-family apartment buildings have been studied in Finland in two large-scale studies between the years 2002 and 2009. This paper is based on the measurements of airtightness of 170 single-family detached houses and 56 apartments by fan pressurisation method at 50 Pa. The mean air change rate of 10 autoclaved aerated concrete block, 10 shuttering concrete block, 10 concrete element, 10 brick masonry, 10 lightweight aggregate concrete block, 100 timber-framed, and 20 log single-family houses was 1.5 h⁻¹, 1.6 h⁻¹, 2.6 h⁻¹, 2.8 h⁻¹, 3.2 h⁻¹, 3.9 h⁻¹ and 6.0 h⁻¹, respectively. In concrete-built multi-storey houses, in which the intermediate floor was cast on site, the mean n₅₀-value of 23 apartments was 0.7 h⁻¹. The mean n₅₀-value of 20 apartments in multi-storey houses built from concrete elements was 1.6 h⁻¹. 16 apartments in timber-framed multi-storey houses had a mean n₅₀-value of 2.9 h⁻¹. Factors like construction method and insulation material (polyurethane insulation) in timber-framed houses, seam insulation material in log houses and ceiling structure in heavyweight buildings among others were found to have an effect on the average values of air change rates. The mean values of airtightness do not satisfy the recommended level of airtightness in Finland. Most important result, however, is that good airtightness of
individual houses was reached within all house groups regardless of the choice of structure, storeys, ventilation system or technology of construction.

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Organisations: Department of Civil Engineering, Life Cycle Effectiveness of the Built Environment (LCE@BE), Aalto University, Department of Civil and Structural Engineering

Authors: Vinha, J., Manelius, E., Korpi, M., Salminen, K., Kurnitski, J., Kiviste, M., Laukkarinen, A.

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Scopus rating (2009): SJR 1.028 SNIP 1.865
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Scopus rating (2007): SJR 0.788 SNIP 1.778
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Scopus rating (2003): SJR 0.948 SNIP 0.921
Scopus rating (2002): SJR 0.998 SNIP 1.39
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**Arsenic in bedrock, soil and groundwater - The first arsenic guidelines for aggregate production established in Finland**

Concern over arsenic (As)-rich drinking water has gained worldwide attention since the 1990s, when the problem was discovered in West Bengal in India and in Bangladesh. Since then, authorities and research institutes have focused on risk assessment and management for As in Finland. Nationwide geochemical mapping projects determined background levels and revealed regions with a higher than average As content in bedrock and soil. Approximately 10% of the citizens in Finland use drinking water from private wells. Groundwater, especially from drilled bedrock wells, may contain As concentrations higher than 10 μg/L, the European Union quality guideline for As in drinking water. Here, we present the outcome of two European Union projects, RAMAS and ASROCKS, which based their conclusions on nationwide databases and thousands of samples. Both RAMAS and ASROCKS focused on the Tampere-Häme region of Southern Finland, where bedrock and soil contain more As than in other parts of Finland on average. Over 1000 groundwater samples revealed that drilled bedrock wells may contain As-rich water in certain geological units. Naturally occurring As in bedrock and soil may also cause the mobilization of As during rock aggregate production and construction activities,
potentially impacting on groundwater aquifers, surface waters, and biota. Arsenic concentrations in aggregate production and construction exceeded the regional background levels in some bedrock and aggregate product samples, but during leaching tests As concentrations were found to be low. Based on the results, risk management tools were revised and guidelines for the rock aggregate industry were established in cooperation with authorities, companies, and other stakeholders. To our knowledge, the guidelines established were the first in the world. The guidelines for As for the aggregate and construction industries can be applied in other countries and adapted to local conditions.

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Scopus rating (2014): SJR 3.961 SNIP 3.797 CiteScore 8.46
Scopus rating (2013): SJR 4.195 SNIP 4.103 CiteScore 8.44
Scopus rating (2012): SJR 4.352 SNIP 4.184 CiteScore 7.98
Scopus rating (2011): SJR 4.24 SNIP 3.634 CiteScore 6.75
Scopus rating (2010): SJR 4.245 SNIP 3.477
Scopus rating (2009): SJR 4.725 SNIP 4.23
Scopus rating (2008): SJR 3.995 SNIP 3.194
Scopus rating (2007): SJR 3.813 SNIP 3.279
Scopus rating (2006): SJR 2.908 SNIP 3.335
Scopus rating (2005): SJR 3.667 SNIP 3.302
Scopus rating (2004): SJR 3.804 SNIP 3.581
Scopus rating (2003): SJR 3.241 SNIP 2.881
Scopus rating (2002): SJR 2.103 SNIP 1.998
Scopus rating (2001): SJR 2.13 SNIP 2.637
Scopus rating (2000): SJR 2.276 SNIP 2.451
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Source: Scopus
Source-ID: 84943781121
Research output: Scientific - peer-review › Article

Power generation in fed-batch and continuous up-flow microbial fuel cell from synthetic wastewater
Up-flow bioreactors have the advantages of retaining very high cell density and having high mass transfer efficiency. The recirculation rate could improve the up-flow rate in up-flow bioreactor. A two-chamber UFMFC (up-flow microbial fuel cell) is constructed with flat graphite electrodes and anion exchange membrane for electricity generation. The anode chamber is seeded with compost culture enriched on xylose and operated on synthetic wastewater with 0.5 g/L xylose, external resistance of 100 Ω, at pH 7.0 and 37 °C in fed-batch mode. The cathode chamber in the top of the UFMFC is filled with potassium ferricyanide (pH 7.0) as the electron acceptor. The effects of different recirculation rates of 1.2, 2.4, 4.8 and 7.2 RV (reactor-volumes)/h to increase the mass transfer and electricity production are determined in fed-batch mode. At a recirculation rate of 4.8 RV/h, a power density of 356 ± 24 mW/m² with CE (coulombic efficiency) of 21.3 ± 1.0% is...
obtained. Decreasing HRT (hydraulic retention time) could improve the electricity production performance of UFMFC in continuous mode. The power generation is increased to 372 ± 20 mW/m², while CE remains at 13.4 ± 0.5% with HRT of 1.7 d and optimum recirculation rate of 4.8 RV/h on continuous mode. Microbial communities were characterized with PCR (polymerase chain reaction) - DGGE (denaturing gradient gel electrophoresis). In the end of the experiment, the biofilm contained both fermenting and exoelectrogenic bacteria, while fermenting and nitrate-reducing bacteria were mainly present in the anodic solutions. Moreover, some changes occurred in the microbial communities of the anodic solutions when the MFCs were switched from fed-batch to continuous mode, while the differences were minor between different recirculation rates in fed-batch mode.

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Scopus rating (2013): SJR 2.54 SNIP 2.593 CiteScore 5.02
Scopus rating (2012): SJR 1.998 SNIP 2.25 CiteScore 4.25
Scopus rating (2011): SJR 1.609 SNIP 2.043 CiteScore 4
Scopus rating (2010): SJR 1.814 SNIP 2.725
Scopus rating (2009): SJR 1.729 SNIP 2.313
Scopus rating (2008): SJR 1.106 SNIP 1.444
Scopus rating (2007): SJR 0.913 SNIP 1.481
Scopus rating (2006): SJR 0.875 SNIP 1.306
Scopus rating (2005): SJR 0.965 SNIP 1.203
Scopus rating (2004): SJR 0.711 SNIP 1.115
Scopus rating (2003): SJR 1.093 SNIP 1.496
Scopus rating (2002): SJR 0.952 SNIP 1.287
Scopus rating (2001): SJR 1.081 SNIP 1.078
Scopus rating (2000): SJR 0.82 SNIP 0.992
Scopus rating (1999): SJR 0.632 SNIP 0.659
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Research output: Scientific - peer-review › Article

**Evolution of Community-Managed Water Supply Projects From 1994 to the 2010s in Ethiopia**

This article discusses the evolution of community-managed projects (CMPs) along with the global community-based management of water supply and sanitation services since the 1960s, particularly the evolution of Ethiopian water resources development in the last century. The study was conducted with intensive reviews of journals, reports, project documents, and discussions with the people involved in CMP implementation, including many Ethiopian government officials. The article presents the various development phases of the water and sanitation sector in Ethiopia together with national and global influences. Currently, in the 2010s, the CMP financing mechanisms and the national development of water supply and sanitation are more organized and integrated, and are in the stage of scaling up. The recently agreed
national water, sanitation, and hygiene strategic framework is expected to have significant impacts on the rural water supply and sanitation development in Ethiopia.

**General information**

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Organisations: Department of Chemistry and Bioengineering, Life Cycle Effectiveness of the Built Environment (LCE@BE), Community-Led Accelerated WASH (COWASH) Project
Authors: Behailu, B. M., Suominen, A., Katko, T. S.
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Scopus rating (2014): SJR 0.36 SNIP 0.776 CiteScore 0.4
Scopus rating (2013): SJR 0.39 SNIP 0.699 CiteScore 0.32
Scopus rating (2012): SJR 0.407 SNIP 0.418 CiteScore 0.37
Scopus rating (2011): SJR 0.375 SNIP 0.646 CiteScore 0.37
Scopus rating (2010): SJR 0.264 SNIP 0.953
Scopus rating (2009): SJR 0.102 SNIP 0
Scopus rating (2008): SJR 0.105
Scopus rating (2007): SJR 0.122
Scopus rating (2005): SJR 0.101 SNIP 0
Scopus rating (2004): SJR 0.1 SNIP 0.092
Scopus rating (2003): SJR 0.1 SNIP 0
Scopus rating (2002): SJR 0.156 SNIP 0.414
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**The Effect of Phosphorus Exposure on Diesel Oxidation Catalysts-Part I: Activity Measurements, Elementary and Surface Analyses**

The effects of phosphorus poisoning on the activity of PtPd and Pt diesel oxidation catalysts and on the activity of the support material were investigated using the gas phase laboratory-scale-aging procedure. The catalysts were treated using two different phosphorus concentrations (0.065 and 0.13 mol/L (NH4)(2)HPO). The deactivation was studied by inductively coupled plasma optical emission spectroscopy, electron microscopy, X-ray diffractometry, X-ray photoelectron spectrometry and Fourier-transform infrared reflectance, N2-physisorption, and activity measurements with CO, C3H6 and NO. The amount of accumulated phosphorus was higher on the Pt catalyst surface than on the PtPd catalyst and significantly higher on the surface of the bare support material. Phosphorus concentration was uniform throughout the support layer (down to the 10 µm), and phosphorus was found as phosphate, although it can also form compounds like AIPO(4) with the support. The treatment with low phosphorus concentration was found to have a clear deactivation effect only for C3H6 oxidation activity on PtPd catalysts above 200 degrees C. The treatment with high phosphorus concentration significantly decreased the activity of both the PtPd and Pt catalysts. In particular, the C3H6 and NO oxidation activities of the fresh and P-treated Pt catalysts were higher than those of the PtPd catalysts for the entire
Phosphorus poisoning and its effect on the diesel oxidation catalysts morphology was studied by transmission electron microscopy (TEM). The studied catalyst samples were PtPd or Pt supported on the alumina-based washcoat including additives. The laboratory-scale phosphorus exposures were carried out with two different phosphorus concentrations. The cross-sectional TEM samples were prepared from the fresh and phosphorus-treated catalysts. After phosphorus exposures, significant structural changes were observed compared to the fresh catalysts. The shape of the noble metal particles had changed from irregular to more spherical-shaped particles. In addition, phosphorus was detected throughout the catalyst TEM samples but the amount varied depending on the local composition of the support. Phosphorus accumulated mainly in the alumina-containing areas of the support and indications of dense and amorphous aluminum phosphates were found. Based on the results gained, cross-sectional TEM characterization is essential to observe these kinds of morphological changes in the catalysts caused e.g. by phosphorus exposures. In addition, cross-sectional TEM samples are needed to study the effect of local variation in the support composition on the phosphorus accumulation.
In this article, the current management paradigm of water services in Finland is conceptualised. For this purpose, the managers of water utility in ten Finnish municipalities were interviewed. Consequently, the ways in which water services are perceived and managed are also described in this article. In addition, it is argued that the current paradigm produces systemic behaviour that can be considered to give rise to unsustainable ways of developing water services. Based on the problems of the current paradigm, an alternative paradigm is drafted that rethinks the value-creation logic. This alternative paradigm implies that one should be aware of the interactions between systems in which water services play a crucial role, and act accordingly.
Selecting an indigenous microalgal strain for lipid production in anaerobically treated piggery wastewater

The aim of this study was to select a potential microalgal strain for lipid production and to examine the suitability of anaerobically treated piggery wastewater as a nutrient source for production of lipid-rich biomass with the selected microalgae. Biomass and lipid productivity of three microalgal strains (Chlorella sorokiniana CY1, Chlorella vulgaris CY5 and Chlamydomonas sp. JSC-04) were compared by using different media, nitrogen sources, and nitrogen concentrations. The highest lipid content and productivity (62.5 wt%, 162 mg/L/d) were obtained with C. vulgaris with BG-11 with 62 mg N/L. Secondly, C. vulgaris was cultivated in sterilized, diluted (1–20×), anaerobically treated piggery wastewater. Biomass production decreased and lipid content increased, when wastewater was more diluted. The highest lipid content of 54.7 wt% was obtained with 20× dilution, while the highest lipid productivity of 100.7 mg/L/d with 5× dilution. Piggery wastewater is a promising resource for mass production of oleaginous microalgal biomass.
Dry Toilet Sanitation as an Alternative Solution to the Rural Ethiopia

This paper intended to explore the sanitation situation of the rural Ethiopia and evaluate how the existing situation can welcome dry toilet as an alternative for sanitation. The study was based on the field survey, literature reviews and field observation during November-December of 2012 and 2013, and June 2014. The survey found out that a lot has been done in the area, but it is too early to declare that the question is solved. In terms of DT sanitation policy and promotion intra-ministerial collaborations are improving. Moreover, the traditional use of night soil for the crops that are eaten cooked is an interesting part to be taken into account when considering dry toilet.

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Authors: Behailu, B. M.
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Electricity production by a microbial fuel cell fueled by brewery wastewater and the factors in its membrane deterioration

Electricity production from brewery wastewater using dual-chamber microbial fuel cells (MFCs) with a tin-coated copper mesh in the anode was investigated by changing the hydraulic retention time (HRT). The MFCs were fed with wastewater samples from the inlet (inflow, MFC-1) and outlet (outflow, MFC-2) of an anaerobic digester of a brewery wastewater treatment plant. Both chemical oxygen demand removal and current density were improved by decreasing HRT. The best MFC performance was with an HRT of 0.5 d. The maximum power densities of 8.001 and 1.843 µW/cm² were obtained from reactors MFC-1 and MFC-2, respectively. Microbial diversity at different conditions was studied using PCR-DGGE profiling of 16S rRNA fragments of the microorganisms from the biofilm on the anode electrode. The MFC reactor had mainly Geobacter, Shewanella, and Clostridium species, and some bacteria were easily washed out at lower HRTs. The fouling characteristics of the MFC Nafion membrane and the resulting degradation of MFC performance were
examined. The ion exchange capacity, conductivity, and diffusivity of the membrane decreased significantly after fouling. The morphology of the Nafion membrane and MFC degradation were studied using scanning electron microscopy and attenuated total reflection-Fourier transform infrared spectroscopy.

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Authors: Çetinkaya, A. Y., Köroğlu, E. O., Demir, N. M., Baysoy, D. Y., Özkaya, B., Çakmakçi, M.
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Scopus rating (2013): SJR 0.41 SNIP 0.674 CiteScore 1.39
Scopus rating (2012): SJR 0.373 SNIP 0.73 CiteScore 1.32
Scopus rating (2011): SJR 0.373 SNIP 0.69 CiteScore 1.28
Scopus rating (2010): SJR 0.345 SNIP 0.477
Scopus rating (2009): SJR 0.335 SNIP 0.555
Scopus rating (2008): SJR 0.293 SNIP 0.582
Scopus rating (2007): SJR 0.253 SNIP 0.378
Scopus rating (2006): SJR 0.216 SNIP 0.339
Scopus rating (2005): SJR 0.29 SNIP 0.488
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Research output: Scientific - peer-review › Article

Subpicosecond to Second Time-Scale Charge Carrier Kinetics in Hematite-Titania Nanocomposite Photoanodes
Water splitting with hematite is negatively affected by poor intrinsic charge transport properties. However, they can be modified by forming heterojunctions to improve charge separation. For this purpose, charge dynamics of TiO2:alpha-Fe2O3 nanocomposite photoanodes are studied using transient absorption spectroscopy to monitor the evolution of photogenerated charge carriers as a function of applied bias voltage. The bias affects the charge carrier dynamics, leading to trapped electrons in the submillisecond time scale and an accumulation of holes with a lifetime of 0.4 +/- 0.1 s. By contrast, slower electron trapping and only few long-lived holes are observed in a bare hematite photoanode. The decay of the long-lived holes is 1 order of magnitude faster for the composite photoanodes than previously published for doped hematite, indicative of higher catalytic efficiency. These results illustrate the advantages of using composite materials to overcome poor charge carrier dynamics, leading to a 30-fold enhancement in photocurrent.
Catalytic effect of Ca and K on CO2 gasification of spruce wood char

Gasification is one route to produce chemicals and liquid fuels from biomass. The gasification of the char is catalyzed by alkali and alkaline earth metals in the biomass. In this work the catalytic effect of calcium (Ca) and potassium (K) on CO2 gasification of spruce wood was studied using a thermo gravimetric analyzer (TGA). The ash-forming elements were first removed from the wood using an acid leaching method. Then, various concentrations of K and Ca were absorbed to the wood by ion-exchange to carboxylic and phenolic groups, impregnation of K2CO3 or physically mixing of CaC2O4. The prepared spruce samples were placed in a mesh holder and gasified in the TGA at 850°C in 100% CO2. The results demonstrate that the gasification rate of the char increased linearly with an increase in the concentration of Ca or K. Crystalline CaC2O4 distributed only at the surface of the wood particles resulted in low catalytic activity. The catalytic activity of Ca was higher than K in the beginning of char gasification but the catalytic effect of Ca decreased earlier than the catalytic effect of potassium. Further, the char structure was investigated by SEM-EDX. The SEM analysis from interrupted gasification experiments showed the formation of CaCO3 and K2CO3 layer on the char surface. By adding corresponding levels of Ca and K as the original spruce to the acid washed sample, a similar gasification reactivity was obtained at 850 °C.
Are Finns walking the talk?: Examining the national collaboration process on engineering education for sustainable development five years later

In 2009, the National Collaboration Group for Finnish Engineering Education published a proposal for action on sustainable development (SD). The aim of this paper is to analyze how the three main universities providing engineering education have fulfilled their commitments. The study consists of interviews with key stakeholders supplemented with the analysis of documented material. It is argued that the studied universities are now committed to SD in their strategies. However, a lot of work remains to be done before the strategies are implemented and SD is integrated to all degree programmes. Recommendations for the next steps are presented.
Characteristics and agronomic usability of digestates from laboratory digesters treating food waste and autoclaved food waste

Digestate characteristics such as organic and nutrient content, hygienic quality and stability are valuable measures when evaluating the use of food waste (FW) digestate as organic fertiliser. This study compared the characteristics of FW and autoclaved (160 °C, 6.2 bar) FW and their digestates from laboratory-scale reactors. Decreased ammonification and low ammonium nitrogen content were observed in the digestate from an autoclaved FW reactor due to autoclave treatment of FW, which affected the nitrogen-containing molecules by formation of Maillard compounds. The methane potential of autoclaved FW and its digestate was decreased by 40% due to reduced microbial activity as microbes were not able to adapt to the conditions within a reactor fed with autoclaved FW. Both studied materials were suitable for agricultural use in terms of their nutrient content, hygienic quality and stability, and thus the decrease in ammonium nitrogen in digestate from an autoclaved FW reactor supported the use of digestate as soil amendment rather than fertiliser.
Development of an assessment protocol: the impact of energy retrofits on indoor environmental quality and public health in the existing building stock

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Authors: Du, L., Leivo, V., Kiviste, M., Martuzevicius, D., Turunen, M., Prasauskas, T., Haverinen-Shaughnessy, U.
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Research output: Scientific - peer-review › Conference contribution

Short Global History of Fountains
Water fountains are part of every human settlement, and historical and mythological stories. They are the source from which life-sustaining water was distributed to people until piped systems started providing fresh tap water inside buildings. In many places, people visit fountains to experience the freshness of running water, to prepare for prayers, or to make a wish. Fountains have also provided water for the people of cities under siege, and purified believers as part of holy rites. The Castalia shrine in Delphi, Greece, for its part, is a spot where various groups of people come to socialize, which greatly improves the quality of their lives. This paper is a look back through the history of fountains in various parts of the world. Experts from various areas have identified the historic, cultural, and ritualistic aspects of fountains and their findings are summarized. The paper concludes by providing a glimpse into the role of fountains in modern society and their continued influence in our lives today.

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Fermentative metabolism of an anaerobic, thermophilic consortium on plant polymers and commercial paper samples

The purpose of the study was to examine the feasibility and capacity of a thermophilic microbial consortium to produce fermentative metabolites from plant polymers. The consortium comprised of cellulolytic anaerobes that were originally enriched from a compost pile using cellulose as the substrate. Fermentative metabolism was examined with monosaccharides, disaccharides, hemicellulose, starch, pectin, chitin, and eight commercial paper samples without further enrichment of the culture to each specific substrate. In general, H2, CH4, CO2, and organic acids were the main metabolites on all substrates but the metabolite profiles varied with the substrate. Similar H2 yields of 2-3 mol mol⁻¹ substrate at 48h were obtained with all monosaccharides and disaccharides. The CO2 yields were higher with disaccharides than with monosaccharides, 4.5 vs 2 mol mol⁻¹ substrate. Metabolite yields were relatively low with glyceraldehyde, glycerol, and arabinose. Paper samples containing high amounts of chemical pulp produced the highest metabolite yields, and biodegradation accounted for ≤74% of total dry weight loss. The fermentative metabolism of the paper samples varied with the pulp composition and the amount of inorganic material. Bacterial community analysis using pyrosequencing analysis of 16S rRNA gene showed a predominance of members of the order Clostridiales, including members of genera Clostridium and Lutispora, which contain known cellulolytic organisms. Most differences among the samples were attributed to small taxonomic groups represented by ≤10% of total sequences.
Ecological Sanitation - A Logical Choice? The Development of the Sanitation Institution in a World Society

Sustainability, encompassing ecological, economic as well as sociocultural aspects, has become a driving force for many political and administrative decisions. It is no longer enough to follow old practices or rely on profit margins – it is necessary to consider the needs of society and nature in a more holistic way as a larger whole. Sustainability is the key word also in terms of sanitation; ecological sanitation, or ecosan for short, has come to mark the sustainable approach to handling human excreta.

In 2014, there are still approximately 2.5 billion people in the world without access to adequate sanitation; 1.1 billion practice open defecation. Lack of sanitation is often – but not necessarily – linked to lack of clean drinking water and poor hygiene. However, poor wastewater treatment also occurs in more developed countries as well as in times of crisis. In the case of natural disasters, even waterborne sanitation, which is often considered the norm, does not prevent the risk of contamination from pathogens. Ecological sanitation aims at a closed cycle of nutrients and absence of water; dry toilets, composting and urine diversion help to return nutrients back into the soil.

Based on these challenges, it is necessary to examine alternatives to the current toilet institution that considers waterborne sanitation as the norm. This dissertation explores the feasibility of ecological sanitation as a potential alternative to the mainstream option and the aim is to discover which issues affect the development and change of the current waterborne toilet institution. From a multi- and interdisciplinary point of view, the dissertation determines the various aspects affected by ecosan, such as water and environment, health, culture, education, agriculture, business and technology, and from these points of view develops futures scenarios for sustainable sanitation practices. Technology is here defined beyond artefacts and processes encompassing also knowhow as well as the sociotechnical systems of use, including legislation, culture and practices.

The data collected for this research includes expert interviews (n=11), case studies from Ethiopia, Finland, New Zealand and Zambia, and literature review including various policy documents and legislation of the aforementioned case countries to shed light to the current state of ecological sanitation and how it is taken into account from a legal perspective. In addition, a two-round consensus-Delphi survey (n1=44, n2=22) together with theme seminars was conducted among Finnish experts to determine the future potential of ecological sanitation.

Through qualitative data analyses, the potential futures and desirable outcomes are mapped with the help of futures research and environmental scanning. The overall challenge of potentially changing the waterborne toilet institution is discussed in the light of the World Polity Theory – with the understanding that global norms are valid everywhere and that change eventually must start from intergovernmental actors rather than political decision makers.

This research brings more insight to the relatively unknown and overlooked subject of ecological sanitation. The integrated approach offers new insight into sustainable sanitation practices and closed loop approach from view points of the various sectors of society, including social, economic and ecological aspects. The undisputed challenges of inadequate sanitation facilities faced by 2.5 billion people worldwide are generally not recognized in scientific literature, although several invaluable studies have contributed to the field. Still, concrete results for improvement are still required.

The results of this study find that ecological sanitation must be approached from a multidisciplinary point of view in order to understand the variety of sectors impacted by these sustainable practices. As a conclusion it can be stated that the traditional norms in waterborne sanitation are difficult to change but the pressure of limited phosphorus resources and deteriorating or non-existing infrastructure require alternative solutions to the norm. As yet, legislation has generally not
allowed or considered the use of human excreta as fertiliser, but practices are slowly changing along with attitudes. Institutions do not change easily but can do so while attitudes, policies and practices all start adopting new ways of operating.

It is possible that in the future ecological sanitation will indeed be accepted as a feasible option along with other sanitation methods. This is supported also by the increasing need for sustainable practices in societies. However, in more daunting futures the lack of closed cycles will lead to shortages in resources as well as the lack of wellbeing in communities without access to sanitation. Thus, the research of sustainable sanitation solution is significant and necessary – also in the future.

Fluidized-bed denitrification of mining water tolerates high nickel concentrations

This study revealed that fluidized-bed denitrifying cultures tolerated soluble Ni concentrations up to 500mg/L at 7-8 and 22°C. From 10 to 40mg/L of feed Ni, denitrification resulted in complete nitrate and nitrite removal. The concomitant reduction of 30mg/L of sulfate produced 10mg/L of sulfide that precipitated nickel, resulting in soluble effluent Ni below 22mg/L. At this stage, Dechloromonas species were the dominant denitrifying bacteria. From 60 to 500mg/L of feed Ni, nickel remained in solution due to the inhibition of sulfate reduction. At soluble 60mg/L of Ni, denitrification was partially inhibited prior to recover after 34days of enrichment by other Ni-tolerant species (including Delftia, Zoogloea and Azospira) that supported Dechloromonas. Subsequently, the FBR cultures completely removed nitrate even at 500mg/L of Ni. Visual Minteq speciation model predicted the formation of NiS, NiCO₃ and Ni₃(PO₄)₂, whilst only Ni₃(PO₄)₂ was detected by XRD.

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Improved bioconversion of crude glycerol to hydrogen by statistical optimization of media components

Bioconversion of crude glycerol to hydrogen has gained importance as it addresses both sustainable energy production and waste disposal issues. Until recently, statistical optimizations of crude glycerol bioconversion to hydrogen have been greatly focused on pure strains. In this study, biohydrogen production from crude glycerol by an enriched microbial culture (predominated with Clostridium species) was improved by statistical optimization of media components. Plackett-Burman design identified MgCl₂·6H₂O and KCl with negative effect on hydrogen production and selected NH₄Cl, K₂HPO₄ and KH₂PO₄ as significant variables. Box-Behnken design indicated the optimal region beyond design area and studies were continued by ridge analysis. Central composite face centered design envisaged a maximal hydrogen yield of 1.41 mol-H₂/mol-glycerol consumed at concentrations 4.40 g/L and 2.27 g/L for NH₄Cl and KH₂PO₄ respectively. Confirmation experiment with the optimized media (NH₄Cl, 4.40 g/L; K₂HPO₄, 1.6 g/L; KH₂PO₄, 2.27 g/L; MgCl₂·6H₂O, 1.0 g/L; KCl, 1.0 g/L; Na-acetate·3H₂O, 1.0 g/L and tryptone, 2.0 g/L) revealed an excellent correlation between predicted and experimental hydrogen yield. Optimization of media components by design of experiments enhanced hydrogen yield by 29%.
Appropriate pricing policy needed worldwide for improving water services infrastructure

This article highlights the enormous and growing gap between the projected and required financing of water services infrastructure, which is caused by unviable pricing and/or cost-recovery regimes. Globally there is a growing funding gap in rehabilitation, renewal, and replacement of aging water infrastructure and the need for future greenfield investments. Underpricing of water services and the need for rehabilitation seem to be worldwide phenomena. There are diverse constraints in OECD (Organisation for Economic Co-Operation and Development) and non-OECD countries contributing to underpriced water services; however, the message is clear: the global water industry must stop underpricing precious water resources. Future enjoyment of sustainable water services will require customers to bear all or at least a major part of the costs. Better awareness of broader economic and social benefits of water supply, and particularly of sanitation, also will be needed.

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Scopus rating (2008): SJR 0.446 SNIP 1.045
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Acid Leaching of Cu and Zn from a Smelter Slag with a Bacterial Consortium
A study of a condensing heat exchanger and electrostatic precipitator combination for small-scale wood combustion

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Authors: Grigonyte, J., Sippula, O., Tissari, J., Laitinen, A., Keskinen, J., Kortelainen, M., Lamberg, H., Jokiniemi, J.
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Betonielementtien uudelleenkäyttömahdollisuudet

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**Biological Nitrogen Removal from Acidic, Heavy-metal Containing Waters**

**General information**

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Authors: Zou, G.
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Electricity generation from tetrathionate in microbial fuel cells by acidophiles

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Scopus rating (2013): SJR 1.822 SNIP 2.458 CiteScore 5.09
Scopus rating (2012): SJR 1.985 SNIP 2.467 CiteScore 4.73
Scopus rating (2011): SJR 1.918 SNIP 2.11 CiteScore 4.81
Scopus rating (2010): SJR 1.671 SNIP 1.704
Scopus rating (2009): SJR 1.649 SNIP 2.023
Scopus rating (2008): SJR 1.247 SNIP 1.534
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Scopus rating (2002): SJR 0.594 SNIP 0.91
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Erosion testing of filled and/or reinforced vinyl ester composites in water medium at elevated temperature

General information
State: Published
Factors affecting the elimination capacity of a passive methane biofilter

Passive biofilters are used for controlling CH₄ emissions from different sources with the help of methanotrophic bacteria. The CH₄ elimination capacity of a biofilter can be affected by different factors, such as the structure and composition of the filter material and formation of bacterial exopolymeric saccharides (EPS). Recognising these factors and resolving their effect on the elimination capacity is important for efficient greenhouse gas emission control. Hence, we studied the evolution of the elimination capacity of a passive CH₄ biofilter containing soil as low-cost filter material. We aimed at identifying the factors affecting the elimination capacity and tested the effectiveness of a mechanical regeneration method for improving the operation efficiency. A laboratory-scale biofilter containing landfill soil was operated for 148 days. The CH₄ removal efficiency reached 70% in the beginning of the operation (0–7 days), but stabilised at 25% after 50 days. The filter bed was mixed and loosened twice during the operation. As a result, the glucose content of the soil representing the clogging agent secreted by bacteria (EPS) remained stable throughout the experiment (23 mg g⁻¹ dw) and O₂ penetrated deeper in the filter bed indicating improved gas diffusion. However, the CH₄ removal efficiency did not increase from 25–30%. The reason for this remained unknown, but the results indicated that soil as filter material was able to maintain its elimination capacity despite the formation of EPS. Mixing was shown to be an effective and necessary method for improving the gas diffusion properties of the filter bed.

Fe₂O₃-TiO₂ Nano-heterostructure Photoanodes for Highly Efficient Solar Water Oxidation

Harnessing solar energy for the production of clean hydrogen by photo-electrochemical water splitting represents a very attractive, but challenging approach for sustainable energy generation. In this regard, the fabrication of Fe₂O₃-TiO₂ photoanodes is reported, showing attractive performances [≈2.0 mA cm⁻² at 1.23 V vs. the reversible hydrogen electrode in 1 M NaOH] under simulated one-sun illumination. This goal, corresponding to a tenfold photoactivity enhancement with respect to bare Fe₂O₃, is achieved by atomic layer deposition of TiO₂ over hematite (α-Fe₂O₃) nanostructures fabricated by plasma enhanced-chemical vapor deposition and final annealing at 650 °C. The adopted approach enables an intimate Fe₂O₃-TiO₂ coupling, resulting in an electronic interplay at the Fe₂O₃/TiO₂ interface. The reasons for the photocurrent enhancement determined by TiO₂ overlayers with increasing thickness are unraveled by a detailed chemico-physical investigation, as well as by the study of photo-generated charge carrier dynamics. Transient absorption spectroscopy shows that the increased photoelectrochemical response of heterostructured photoanodes compared to bare hematite is due to an enhanced separation of photogenerated charge carriers and more favorable hole dynamics for water oxidation. The stable responses obtained even in simulated seawater provides a feasible route in view of the eventual large-scale generation of renewable energy.
Fungal treatment of landfill mining fine fraction to increase its stability and end-use potential

Landfill mining, i.e. extraction, processing, treatment and recovery of landfilled materials, is conducted to prevent pollution and to recover materials and energy from waste (Krook et al., 2012). On average, half of landfilled waste is material resembling soil, i.e. its fine fraction (FF, < 20 mm) (Kaartinen et al., 2013). The end-use potential of the FF is limited due to its organic matter content, a possible presence of harmful contaminants as well as its stability. The aim of this study was to evaluate if fungal treatment stabilises FF and removes organic contaminants thus allowing an end-use of FF as soil-like material. Basidiomycetous fungi were obtained and maintained according to Valentin et al. (2008) prior to experiments and were screened for their potential to grow in FF originally landfilled between 1967 – 1989. Screening experiments and previous experiences with contaminated soil (Valentin et al. 2008) led to the selection of Phanerochaete velutina for fungal treatment experiments, which were carried out at room temperature for 58 days. Two acryl columns (height 600 mm, radius 75 mm) were filled with 1 – 2 cm layer of gravel at the bottom and 5.8 kg of FF on the top as well as 500 mL of tap water. The fungal column was amended with fungal bark inoculum to the middle of the column. Two ports at the bottom of the columns were used to collect leachate and aerate columns with humidified air at 0.1 L/min, respectively. Carbon dioxide (CO2) production was followed during the experiment with gas chromatography. The columns were covered with aluminium foil to stop germination of seeds present in FF. Total solids and volatile solids (VS) were analysed from FF according to standard SFS 3008. Organic contaminants mentioned in criteria for landfilling were analysed from FF in an accredited laboratory. Aerobic stability of FF was determined by the Oxitop method and anaerobic stability of FF was determined as biochemical methane potential. In less than one month, fungal mycelium was observed throughout the FF in the column inoculated with Phanerochaete velutina while no mycelium was observed in the control column. At this stage the experiment was continued in order to allow fungal mycelium to degrade and produce CO2. Concentrations of mineral oils (C10-C40) and organic matter, measured as VS, were higher in FF than in waste that can be placed to landfills. Mineral oil concentrations exceeded Finnish criteria set for contaminated soil. The aerobic stability of FF was high even initially and it did not increase in control or fungal treatments. Fungal treatment reduced organic matter content of FF and reduced mineral oil concentrations, although the criteria set in legislation could not be met in these experiments.
Groundwater as a source of conflict and cooperation: Towards creating mutual gains in a Finnish water supply project

Community planners, decision-makers and authorities frequently encounter conflicts revolving around natural resource management as well as around urban planning. Since the 1970s, the dynamics of conflict resolution have evolved from conventional expert-based rational solutions towards collaborative ones. Against this background, our research investigates one contentious groundwater project in the Tampere Region in Finland. Conflict assessment clarified the divergent interests of the multiple parties. Drawing on negotiation theory, this study illustrates how polarised positions and competitive framing, as well as the influence of historical baggage, may form an insurmountable barrier to successful negotiation. While the acknowledgement of various interests should form the heart of the integrative negotiation process, excessive energy is used for argumentation to protect predefined goals with as minor concessions as possible. Addressing the collaborative approach, we suggest multiple ways towards creating mutual gains and cooperation in future water supply projects.
Importance and challenges of sharing experiences among an international and interdisciplinary group of doctoral students

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**Influence of Diffusion Barriers on Thermal Ageing Behaviour of Solar Absorber Coatings on Copper**
The thermal stability of magnetron sputtered and electroplated solar absorber coatings were investigated at elevated temperatures of 200-500°C. Diffusion barriers of aluminium and nickel were studied towards thermal diffusion of copper substrate atoms.

The diffusion barriers studied were experimental magnetron sputtered Al layers and an industrial electroplated Ni layer between a Cu substrate and an absorber coating. The thicknesses of Al barriers were 0.1 µm and 0.5 µm, and a Ni barrier was 3 µm thick. As absorber coatings, magnetron sputtered chromium-based coatings and industrially electroplated black chromium coatings, were studied. The sputtered absorbers were a 3-layer stack of CrOx/Cr/CrOx with layer thicknesses of 0.05/0.03/0.05 µm, respectively. The electroplated black chromium coating had a thickness of 0.2 µm. Copper was used as a substrate for all of the absorbers studied.

The degradation of the absorber surfaces and influence of diffusion barriers were analysed by optical measurements (solar absorptance with a UV/Vis/NIR spectrophotometer and thermal emittance with a FTIR spectrophotometer), microstructural analyses were performed using a field-emission scanning electron microscope (FESEM). The absorbers were aged by means of heat treatments in a circulating air furnace at 200, 300, 400 and 500°C for two hours. The experimental analyses were performed before and after the ageing studies.

The results showed that without a barrier coating copper substrate atoms can diffuse into the absorber coating and through the coating to the surface of the coating and form CuO islands on the surface. These phenomena degraded optical selectivity of the absorber surface. The diffusion can be prevented or retarded with a diffusion barrier layer between the Cu substrate and the absorber coating. The 3-µm-thick Ni barrier prevented Cu diffusion and retained optical selectivity up to 500°C for two hours and the 0.5-µm-thick Al layer up to 400°C.

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Leveraging concepts for environmentally sustainable business management in construction - a focused review

The main objective of this paper is to advance applied conceptual knowledge about environmentally sustainable business management (BM) in construction. Environmentally sustainable BM is herein defined to encompass the utilization and development of natural resources in ways which are compatible with the maintenance of these resources, and with the conservation of the natural and built environments, for current and future generations. In principle, concept designers can incorporate environmental sustainability into their BM concepts as a dimension, an element, or an attribute of managing, or as a criterion in decision making. Readily, the 71 construction-related BM concepts have been published between 1990 and 2013. A focused review resulted in the expected findings, i.e., only the 11 (15%) construction-related BM concepts have been designed along the environmental sustainability dimension. Thus, it is posited that high-sustainability BM concepts be designed by coupling environmental sustainability with the three other necessary dimensions, i.e., content-free frames of reference on BM, schools of thought on generic BM, and focal contexts in construction, respectively. In turn, CIB-related researchers may adopt these couplings and engage themselves with cross-disciplinary BM conceptualization programs in collaboration with farsighted business managers in construction.
Metals removal and recovery in bioelectrochemical systems: A review

Metal laden wastes and contamination pose a threat to ecosystem well being and human health. Metal containing waste streams are also a valuable resource for recovery of precious and scarce elements. Although biological methods are inexpensive and effective for treating metal wastewaters and in situ bioremediation of metal(loid) contamination, little progress has been made towards metal(loid) recovery. Bioelectrochemical systems are emerging as a new technology platform for removal and recovery of metal ions from metallurgical wastes, process streams and wastewaters. Biodegradation of organic matter by electroactive biofilms at the anode has been successfully coupled to cathodic reduction of metal ions. Until now, leaching of Co(II) from LiCoO$_2$ particles, and removal of metal ions i.e. Co(II/III), Cr(VI), Hg(II), Ag(I), Se(IV), and Cd(II) from aqueous solutions has been demonstrated. This article reviews the state of art research of bioelectrochemical systems for removal and recovery of metal(loid) ions and pertaining removal mechanisms.
Methane oxidation potential of boreal landfill cover materials: The governing factors and enhancement by nutrient manipulation

Methanotrophs inhabiting landfill covers are in a crucial role in mitigating CH₄ emissions, but the characteristics of the cover material or ambient temperature do not always enable the maximal CH₄ oxidation potential (MOP). This study aimed at identifying the factors governing MOPs of different materials used for constructing biocovers and other cover structures. We also tested whether the activity of methanotrophs could be enhanced at cold temperature (4 and 12 °C) by improving the nutrient content (NO₃⁻, PO₄³⁻, trace elements) of the cover material. Compost samples from biocovers designed to support CH₄ oxidation were exhibiting the highest MOPs (4.16 µmol CH₄ g⁻₁ dw⁻¹ h⁻¹), but also the soil samples collected from other cover structures were oxidising CH₄ (0.41 µmol CH₄ g⁻₁ dw⁻¹ h⁻¹). The best predictors for the MOPs were the NO₃⁻ content and activity of heterotrophic bacteria at 72.8 %, which were higher in the compost samples than in the soil samples. The depletion of NO₃⁻ from the landfill cover material limiting the activity of methanotrophs could not be confirmed by the nutrient manipulation assay at 4 °C as the addition of nitrogen decreased the MOPs from 0.090 µmol CH₄ g⁻¹ dw⁻¹ h⁻¹ to < 0.085 µmol CH₄ g⁻¹ dw⁻¹ h⁻¹. At 12 °C, all nutrient additions reduced the MOPs. The inhibition was believed to result from high ionic concentration caused by nutrient addition. At 4 °C, the addition of trace elements increased the MOPs (> 0.096 µmol CH₄ g⁻¹ dw⁻¹ h⁻¹) suggesting that this was attributable to stimulation of the enzymatic activity of the psychrotolerant methanotrophs.

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Peer-reviewed: Yes
Pt-functionalized Fe2O3 photoanodes for solar water splitting: the role of hematite nano-organization and the platinum redox state

Pt-alpha-Fe2O3 nanocomposites were synthesized on fluorine-doped tin oxide (FTO) substrates by a sequential plasma enhanced-chemical vapor deposition (PE-CVD)/radio frequency (RF) sputtering approach, tailoring the overall Pt content as a function of sputtering time. The chemico-physical properties of the as-prepared systems were extensively investigated by means of complementary techniques, including X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), field emission-scanning electron microscopy (FE-SEM), energy dispersive X-ray spectroscopy (EDXS), secondary ion mass spectrometry (SIMS), and optical absorption spectroscopy, and compared to those of the homologous Pt-alpha-Fe2O3 systems annealed in air prior and/or after sputtering. The obtained results evidenced that the material compositional, structural and morphological features, with particular regard to the Pt oxidation state and hematite nano-organization, could be finely tailored as a function of the adopted processing conditions. Pt-alpha-Fe2O3 systems were finally tested as photoanodes in photoelectrochemical (PEC) water splitting experiments, evidencing a remarkable interplay between functional performances and the above-mentioned material properties, as also testified by transient absorption spectroscopy (TAS) results.
Resilient Asset Management and Governance For deteriorating Water Services Infrastructure

This paper argues that strategic asset management and a sound regulatory regime are required urgently if we want to change the current paradigm of aging and decaying water services infrastructure and expand the coverage of improved water services in the developing economies. In the OECD countries access to safe water supply and sanitation has largely been ensured through substantial investment over many decades. Yet, significant investments will still be required to rehabilitate the existing infrastructures, to bring them into conformity with more stringent environmental and health regulations, and to maintain service quality in the future. In the non-OECD countries the challenges are more daunting. Large parts of their population have no access and many suffer from unsatisfactory services. Nearly one billion people lack access to clean drinking water and 2.6 billion people lack access to improved sanitation services. Lack of sound economic regulatory frameworks and enforcement regimes, and poor asset management practices, in particular underpricing of water services is a common problem throughout the world.

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Simulointi nopeuttaa käyttöiän määrittämistä

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Social Norms in Water Services: Exploring the Fair Price of Water

The aim of this article is to analyse price fairness in water services. Although a considerable amount of literature has been published on water pricing, these studies have mainly approached the question from instrumental and rational perspectives. Little attention has been paid to the human side of water pricing. Therefore, the general objective of this research is to shed light on these softer factors, filling the gap in knowledge of the emotional connections with water services. In this research, we explored people's ideas and views about water pricing by conducting 74 interviews in 11 municipalities in Finland. The results suggest that people are not just rational consumers of a good but also have emotional ties to water utilities and municipal decision-making. The general attitude towards a water utility is confident and sympathetic if its operations and municipal decision-making processes are considered as fair, and vice versa. This is a topical issue as many water utilities are facing pressures to increase water prices; being fair appeared to be crucial way to gain appreciation and support through difficult times. Because fairness seems to be an emergent property of social experiences, special attention should be paid to the “soft side” of water services.
Stabilization of fine fraction from landfill mining in anaerobic and aerobic laboratory leach bed reactors

Fine fraction (FF, <20mm) from mined landfill was stabilized in four laboratory-scale leach bed reactors (LBR) over 180 days. The aim was to study feasibility of biotechnological methods to treat FF and if further stabilization of FF is possible. Four different stabilization methods were compared and their effects upon quality of FF were evaluated. Also during the stabilization experiment, leachate quality as well as gas composition and quantity were analyzed. The methods studied included three anaerobic LBRs (one without water addition, one with water addition, and one with leachate recirculation) and one aerobic LBR (with water addition). During the experiment, the most methane was produced in anaerobic LBR without water addition (18.0 LCH<sub>4</sub>/kgVS), while water addition and leachate recirculation depressed methane production slightly, to 16.1 and 16.4 LCH<sub>4</sub>/kgVS, respectively. Organic matter was also removed via the leachate and was measured as chemical oxygen demand (COD). Calculated removal of organic matter in gas and leachate was highest in LBR with water addition (59 gCOD/kgVS), compared with LBR without water addition or with leachate recirculation (51 gCOD/kgVS). Concentrations of COD, ammonium nitrogen and anions in leachate decreased during the experiment, indicating washout mechanism caused by water additions. Aeration increased sulfate and nitrate concentrations in leachate due to oxidized sulfide and ammonium. Molecular weight distributions of leachates showed that all the size categories decreased, especially low molecular weight compounds, which were reduced the most. Aerobic stabilization resulted in the lowest final VS/TS (13.1%), lowest respiration activity (0.9-1.2 mgO<sub>2</sub>/gTS), and lowest methane production after treatment (0.0-0.8 LCH<sub>4</sub>/kgVS), with 29% of VS being removed from FF. Anaerobic stabilization methods also reduced organic matter by 9-20% compared with the initial amount. Stabilization reduced the quantity of soluble nitrogen in FF and did not alter concentration of soluble and insoluble phosphorus, and insoluble nitrogen. All four stabilization methods decreased organic matter and thus are possible stabilization methods for FF, but aerobic treatment was the most efficient in this study.

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Scopus rating (2012): SJR 1.611 SNIP 2.184 CiteScore 2.91
Scopus rating (2011): SJR 1.698 SNIP 2.085 CiteScore 2.99
Scopus rating (2010): SJR 1.555 SNIP 1.78
Scopus rating (2009): SJR 1.502 SNIP 1.899
Scopus rating (2008): SJR 1.378 SNIP 2.13
Scopus rating (2007): SJR 1.035 SNIP 1.767
Scopus rating (2006): SJR 1.046 SNIP 1.749
Scopus rating (2005): SJR 1.059 SNIP 1.65
Scopus rating (2004): SJR 1.289 SNIP 1.939
Scopus rating (2003): SJR 0.847 SNIP 1.269
Scopus rating (2002): SJR 0.561 SNIP 0.874
Scopus rating (2001): SJR 0.456 SNIP 0.696
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The release of nitrogen (N) and phosphorus (P) from agro-industrial sources is a major environmental concern. Furthermore, the scarcity of mineable P and the growing demand for food worldwide necessitate that we find an alternative P source. This study applied struvite precipitation for N-P recovery to slurries with high levels of organics and ammonia to achieve environmental protection from excessive nutrients diffusion and to generate a sustainable P source. Batch tests were carried out on raw and co-digested swine slurries to study the feasibility of struvite precipitation and the effect of several parameters, including pH, reaction time, competing ions (Ca\(^{2+}\), K\(^{+}\)), total solids (TS), and alkalinity. The batch assays with raw swine slurries showed high N-P removals (up to 80%), while the anaerobic liquor returned lower recovery efficiency due to the high solids and alkali content. Struvite crystallization was detected at pH values as low as 6, and the characteristics of the recovered struvite matched those of the theoretical. Slight co-precipitation of calcium-phosphates occurred and was dependent on the Ca\(^{2+}\)/Mg\(^{2+}\) ratio rather than on varying pH values. Struvite precipitation was shown to be feasible in complex matrices as agro-industrial effluents, characterized by high NH\(_4^+\), alkalinity, solids and organic content, and interfering ions such as Ca\(^{2+}\) and K\(^{+}\).
Tighter contracts or more trust? Outsourcing in Finnish water utilities

This article discusses the outsourcing of water utility operations and the prerequisites for successful partnerships between water utilities and external service providers. A questionnaire survey in Finland indicated that the outsourcing of various water utility operations will increase in the future. This trend includes great opportunities to utilize the best features of external service providers and efficiently develop the water services sector. However, the outsourcing also includes risks because there is a lack of trust between water utilities and private companies. Therefore, "hard," rigid contracts are preferred to reduce the uncertainty in outsourcing such undertakings. In uncertain conditions, this approach may not be an effective and fruitful development path in the long term. If relationships are more trust based, uncertainty can actually strengthen these relationships. Thus, more attention should be paid to building trust instead of intensively attempting to reduce uncertainty.

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To fractionate municipal solid waste incineration bottom ash: Key for utilisation?

For the past decade, the Finnish waste sector has increasingly moved from the landfilling of municipal solid waste towards waste incineration. New challenges are faced with the growing amounts of municipal solid waste incineration bottom ash, which are mainly landfilled at the moment. Since this is not a sustainable or a profitable solution, finding different utilisation applications for the municipal solid waste incineration bottom ash is crucial. This study reports a comprehensive analysis of bottom ash properties from one waste incineration plant in Finland, which was first treated with a Dutch bottom ash recovery technique called advanced dry recovery. This novel process separates non-ferrous and ferrous metals from bottom ash, generating mineral fractions of different grain sizes (0–2 mm, 2–5 mm, 5–12 mm and 12–50 mm). The main aim of the study was to assess, whether the advanced bottom ash treatment technique, producing mineral fractions of different grain sizes and therefore properties, facilitates the utilisation of municipal solid waste incineration bottom ash in Finland. The results were encouraging; the bottom ash mineral fractions have favourable behaviour against the frost action, which is especially useful in the Finnish conditions. In addition, the leaching of most hazardous substances did not restrict the utilisation of bottom ash, especially for the larger fractions (>5 mm). Overall, this study has shown that the advanced bottom ash recovering technique can be one solution to increase the utilisation of bottom ash and furthermore decrease its landfilling in Finland.
Utility–Customer Communication: The Case of Water Utilities

The aim of this article is to shed light on the theory and praxis of utility stakeholder communication. Our general research objective is to contrast citizens' experiences of utility-specific information needs with the views of communication managers of municipal water utilities. Empirical data for the study were gathered using two methods. Citizens' views were gathered from street interviews in several Finnish middle-sized cities, whereas the views of communication professionals of municipal water utilities were collected via email-based survey. Empirical analysis shows that one-way communication has its relevance, and it should actually be improved most notably in exceptional situations, such as water supply disruptions. More profound changes in customer communication require, however, that utilities support customers' strive for sustainable and economical water consumption. The overall challenge to utilities is to get closer to the everyday needs of their customers and to develop new communication culture to support such an endeavor.
Vapor phase processing of α-Fe2O3 photoelectrodes for water splitting: An insight into the structure/property interplay

Harvesting radiant energy to trigger water photoelectrolysis and produce clean hydrogen is receiving increasing attention in the search of alternative energy resources. In this regard, hematite (alpha-Fe2O3) nanostructures with controlled nanoorganization have been fabricated and investigated for use as anodes in photoelectrochemical (PEC) cells. The target systems have been grown on conductive substrates by plasma enhanced-chemical vapor deposition (PE-CVD) and subjected to eventual ex situ annealing in air to further tailor their structure and properties. A detailed multitechnique approach has enabled to elucidate between system characteristics and the generated photocurrent. The present alpha-Fe2O3 systems are characterized by a high purity and hierarchical morphologies consisting of nanopyramids/organized dendrites, offering a high contact area with the electrolyte. PEC data reveal a dramatic response enhancement upon thermal treatment, related to a more efficient electron transfer. The reasons underlying such a phenomenon are elucidated and discussed by transient absorption spectroscopy (TAS) studies of photogenerated charge carrier kinetics, investigated on different time scales for the first time on PE-CVD Fe2O3 nanostructures.

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Authors: Warwick, M. E. A., Kaunisto, K., Barreca, D., Carraro, G., Gasparotto, A., Maccato, C., Bontempi, E., Sada, C., Ruoko, T., Turner, S., Van Tendeloo, G.
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Scopus rating (2013): SJR 1.979 SNIP 1.543 CiteScore 6.05
Scopus rating (2012): SJR 2.18 SNIP 1.309 CiteScore 4.94
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Enabling and Integrative Infrastructure Policy: The Role of Inverse Infrastructures in Local Infrastructure Provision with Special Reference to Finnish Water Cooperatives

Infrastructures are necessary to support the functionality of urban communities. Globalization, increased polycentricity, new trends in governance and tightening public budgets have increased interest in alternative ways of providing such infrastructures. One product of this trend is the ‘inverse infrastructure,’ which refers to a modularized, semi-autonomous and user-driven infrastructure that is a result of the self-organization of local actors. In this study, we discuss the nature of such infrastructures and the challenges they pose to local infrastructure policy with special reference to the case of water cooperatives in Finland. Our conclusion is that inverse infrastructures have a potential to contribute to local infrastructure services either as cost-effective alternative or as supplement to large technical systems. Their full utilization requires, however, enabling and integrative infrastructure policy.
Numerical modeling of fine particle and deposit formation in a recovery boiler

In kraft pulp mills, black liquor is concentrated and burned in recovery boilers to produce steam and power and to recover pulping chemicals. Black liquor contains a large amount of alkali compounds, which form ash with low melting temperatures upon combustion. This causes many problems in recovery boiler operation, including fouling of the heat transfer surfaces, plugging of the flue gas passages, reduction of the heat transfer rate, and corrosion of the superheater tubes. This paper presents a model for simulating fine fume particles formed as a result of condensation of alkali compound vapors in the recovery boiler. The modeling method combines CFD modeling, equilibrium chemistry, and fine particle dynamics in a way that enables simulation of a full scale three-dimensional boiler environment. The model has been partially validated with measurements performed in an operating recovery boiler. The modeling results, particularly for the fume particle composition, agree well with the actual measurements. (C) 2014 Elsevier Ltd. All rights reserved.
Bioprocessing of enhanced cellulase production from a mutant of Trichoderma asperellum RCK2011 and its application in hydrolysis of cellulose

A mutant strain of Trichoderma asperellum RCK2011 was developed through UV-irradiation for enhanced cellulase production and lower catabolite repression. The production of FPase, CMCase and β-glucosidase was optimized under solid state fermentation; up to 20 mM of glucose did not inhibit cellulase production. The mutant strain T. asperellum SR1-7 produced FPase (2.2 IU/gds), CMCase (13.2 IU/gds), and β-glucosidase (9.2 IU/gds) under optimized conditions, which is, 1.4, 1.3, 1.5-fold higher than the wild type. The wild as well as mutant strain produced the cellulases at pH range, 4.0-10.0. Saccharification of pretreated corn cob, wheat straw, and sugarcane bagasse by cellulase from mutant strain SR1-7 resulted in release of reducing sugar at the rate of 530.0 mg/g, 290.0 mg/g, and 335.0 mg/g of substrate, respectively; this is 1.6-fold higher than the wild type strain. © 2014 Published by Elsevier Ltd.
Inhibitory effects of substrate and soluble end products on biohydrogen production of the alkalithermophile Caloramator celer: Kinetic, metabolic and transcription analyses

In this study the tolerance of the alkalithermophile Caloramator celer towards substrate (glucose) and soluble end product (acetate, formate and ethanol) inhibition was assessed employing nonlinear inhibition models. In addition, the effects of subinhibitory concentrations of end products on fermentative metabolism and regulation of 12 key genes involved in pyruvate catabolism were studied. Optimal growth and H₂ production were found at 50 mM of glucose and the critical substrate concentration was observed at 290-360 mM. Two inhibition models revealed that ethanol had a higher inhibitory effect on growth rate, whereas H₂ production kinetics was more sensitive towards increasing concentrations of acetate and formate. Acetate, the main soluble metabolite of the fermentation, inhibited the H₂ production by increasing the ionic strength in the medium. Subinhibitory concentrations of soluble end products induced changes in the metabolite profile of C. celer, specifically exogenous acetate (80 mM) and ethanol (40 mM) slightly increased the H₂ yield by 4 and 7%, respectively. However, despite the observed metabolic shifts, gene regulation was minimal and not always in agreement with the measured product yields. Overall, the results suggest that further optimization of the H₂ production process from C. celer should focus on methods to evolve adapted osmotolerant strains and/or remove soluble metabolites, especially acetate, from the culture. Copyright © 2014, Hydrogen Energy Publications, LLC. Published by Elsevier Ltd. All rights reserved.

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Scopus rating (2012): SJR 1.515 SNIP 1.729 CiteScore 3.96
Scopus rating (2011): SJR 1.456 SNIP 1.837 CiteScore 4.42
Scopus rating (2010): SJR 1.589 SNIP 1.871
Scopus rating (2009): SJR 1.333 SNIP 1.885
Assessment of metabolic flux distribution in the thermophilic hydrogen producer Caloramator celer as affected by external pH and hydrogen partial pressure

Background: Caloramator celer is a strict anaerobic, alkali-tolerant, thermophilic bacterium capable of converting glucose to hydrogen (H₂), carbon dioxide, acetate, ethanol and formate by a mixed acid fermentation. Depending on the growth conditions C. celer can produce H₂ at high yields. For a biotechnological exploitation of this bacterium for H₂ production it is crucial to understand the factors that regulate carbon and electron fluxes and therefore the final distribution of metabolites to channel the metabolic flux towards the desired product.

Results: Combining experimental results from batch fermentations with genome analysis, reconstruction of central carbon metabolism and metabolic flux analysis (MFA), this study shed light on glucose catabolism of the thermophilic alkali-tolerant bacterium C. celer. Two innate factors pertaining to culture conditions have been identified to significantly affect the metabolic flux distribution: culture pH and partial pressures of H₂ (P_H₂). Overall, at alkaline to neutral pH the rate of biomass synthesis was maximized, whereas at acidic pH the lower growth rate and the less efficient biomass formation are accompanied with more efficient energy recovery from the substrate indicating high cell maintenance possibly to sustain intracellular pH homeostasis. Higher H₂ yields were associated with fermentation at acidic pH as a consequence of the lower synthesis of other reduced by-products such as formate and ethanol. In contrast, P_H₂ did not affect the growth of C. celer on glucose. At high P_H₂ the cellular redox state was balanced by rerouting the flow of carbon and electrons to ethanol and formate production allowing unaltered glycolytic flux and growth rate, but resulting in a decreased H₂ synthesis. Conclusion: C. celer possesses a flexible fermentative metabolism that allows redistribution of fluxes at key metabolic nodes to simultaneously control redox state and efficiently harvest energy from substrate even under unfavorable conditions (i.e. low pH and high P_H₂). With the H₂ production in mind, acidic pH and low P_H₂ should be preferred for a high yield-oriented process, while a high productivity-oriented process can be achieved at alkaline pH and high P_H₂.

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Rewiring the wax ester production pathway of acinetobacter baylyi ADP1

Wax esters are industrially relevant high-value molecules. For sustainable production of wax esters, bacterial cell factories are suggested to replace the chemical processes exploiting expensive starting materials. However, it is well recognized that new sophisticated solutions employing synthetic biology toolbox are required to improve and tune the cellular production platform to meet the product requirements. For example, saturated wax esters with alkanol chain lengths C12 or C14 that are convenient for industrial uses are rare among bacteria. Acinetobacter baylyi ADP1, a natural producer of wax esters, is a convenient model organism for studying the potentiality and modifiability of wax esters in a natural host by means of synthetic biology. In order to establish a controllable production platform exploiting well-characterized biocomponents, and to modify the wax ester synthesis pathway of A. baylyi ADP1 in terms product quality, a fatty acid reductase complex LuxCDE with an inducible arabinose promoter was employed to replace the natural fatty acyl-CoA reductase acr1 in ADP1. The engineered strain was able to produce wax esters by the introduced synthetic pathway. Moreover, the fatty alkanol chain length profile of wax esters was found to shift toward shorter and more saturated carbon chains, C16:0 accounting for most of the alkanols. The study demonstrates the potentiality of recircuiting a biosynthesis pathway in a natural producer, enabling a regulated production of a customized bioproduct. Furthermore, the LuxCDE complex can be potentially used as a well-characterized biopart in a variety of synthetic biology applications involving the production of long-chain hydrocarbons. © 2014 American Chemical Society.
A method for finding suitable particle sizes for thermal conversion processes by using a simulation tool focusing on wood particle heat transfer and chemical kinetics

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Anaerobic digestion of autoclaved and untreated food waste

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Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
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An experimental study and numerical modeling of combusting two coal chars in a drop-tube reactor: A comparison between N2/O2, CO2/O2, and N2/CO2/O2 atmospheres

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Scopus rating (2012): SJR 1.852 SNIP 2.465 CiteScore 3.99
Scopus rating (2011): SJR 2.093 SNIP 2.427 CiteScore 4.1
Scopus rating (2010): SJR 1.984 SNIP 2.319
Bacterial diversity and active biomass in full-scale granular activated carbon filters operated at low water temperatures

Granular activated carbon (GAC) filtration enhances the removal of natural organic matter and micropollutants in drinking water treatment. Microbial communities in GAC filters contribute to the removal of the biodegradable part of organic matter, and thus help to control microbial regrowth in the distribution system. Our objectives were to investigate bacterial community dynamics, identify the major bacterial groups, and determine the concentration of active bacterial biomass in full-scale GAC filters treating cold (3.7-9.5°C), physicochemically pretreated, and ozonated lake water. Three sampling rounds were conducted to study six GAC filters of different operation times and flow modes in winter, spring, and summer. Total organic carbon results indicated that both the first-step and second-step filters contributed to the removal of organic matter. Length heterogeneity analysis of amplified 16S rRNA genes illustrated that bacterial communities were diverse and considerably stable over time. α-Proteobacteria, β-Proteobacteria, and Nitrospira dominated in all of the GAC filters, although the relative proportion of dominant phylogenetic groups in individual filters differed. The active bacterial biomass accumulation, measured as adenosine triphosphate, was limited due to low temperature, low flux of nutrients, and frequent backwashing. The concentration of active bacterial biomass was not affected by the moderate seasonal temperature variation. In summary, the results provided an insight into the biological component of GAC filtration in cold water temperatures and the operational parameters affecting it.
Characterization of fine fraction from landfill mining for evaluating methane potential

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Research output: Scientific › Article

Dynamics of microbial communities in untreated and autoclaved food waste anaerobic digesters

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Effect of Temperature on Fume Formation and Deposition in Kraft Recovery Boilers - a Modeling Approach

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Authors: Leppänen, A., Tran, H., Välimäki, E., Oksanen, A.
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Contribution: organisation=keb,FACT1=1
Portfolio EDEND: 2014-06-27
Publisher name: Suomen Soodakattilayhdistys, The Finnish Recovery Boiler Committee; TAPPI
Source: researchoutputwizard
Source-ID: 923
Research output: Scientific - peer-review » Conference contribution

E-sail test payload of the ESTCube-1 nanosatellite

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Number of pages: 12
Pages: 210-221
History of water and sanitation services in Finland in the urban-rural mixture: The Case of the City of Tampere, Finland

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Katko, T. S., Juuti, P. S.
Number of pages: 22
Pages: 498-519
Publication date: 2014

Host publication information
Title of host publication: A History of Water: Water and Urbanization: Series III, Volume 1
Place of publication: London
Publisher: I. B. Tauris
Editors: Tvedt, T., Oestigaard, T.
ISBN (Print): 978-1780764474

Bibliographical note
Contribution: organisation=keb,FACT1=1
Portfolio EDEND: 2014-05-22
Publisher name: Teaduste Akadeemia Kirjastus; Eesti Teaduste Akadeemia
Source: researchoutputwizard
Source-ID: 285
Research output: Scientific - peer-review › Article

Influence of temperature and pretreatments on the anaerobic digestion of wastewater grown microalgae in a laboratory-scale accumulating-volume reactor

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Kinnunen, V., Craggs, R., Rintala, J.
Inverse infrastructures: self-organization in the water services

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O., Anttiroiko, A.
Number of pages: 17
Pages: 299-315
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Water Policy
ISSN (Print): 1366-7017
Ratings:
Scopus rating (2016): CiteScore 1.18 SJR 0.536 SNIP 0.813
Scopus rating (2015): SJR 0.499 SNIP 0.66 CiteScore 1.17
Scopus rating (2014): SJR 0.449 SNIP 0.743 CiteScore 1
Scopus rating (2013): SJR 0.421 SNIP 0.611 CiteScore 0.89
Scopus rating (2012): SJR 0.547 SNIP 0.658 CiteScore 1.44
Scopus rating (2011): SJR 0.568 SNIP 0.848 CiteScore 1.11
Scopus rating (2010): SJR 0.73 SNIP 0.935
Scopus rating (2009): SJR 0.576 SNIP 0.938
Scopus rating (2008): SJR 0.689 SNIP 0.934
Scopus rating (2007): SJR 0.322 SNIP 0.814
Scopus rating (2006): SJR 0.432 SNIP 1.251
Scopus rating (2005): SJR 0.581 SNIP 1.479
Scopus rating (2004): SJR 0.416 SNIP 1.077
Scopus rating (2003): SJR 0.345 SNIP 1.036
Scopus rating (2002): SJR 0.314 SNIP 1.133
Scopus rating (2001): SJR 0.301 SNIP 1.021
Scopus rating (2000): SJR 0.299 SNIP 0.74
Scopus rating (1999): SJR 0.153 SNIP 0.82

Original language: English
DOIs:
10.2166/wp.2014.095
Links:
http://www.iwaponline.com/wp/up/wp2014095.htm

Bibliographical note
doi:10.2166/wp.2014.095<br/>Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2015-01-15
Source: researchoutputwizard
Source-ID: 439
Research output: Scientific - peer-review » Article

Kohti hajautettua infrastruktuuripoliitikkaa?: Paikalliset vesiosuuskunnat perusrakenteiden tuottajina

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Heino, O., Anttiroiko, A.
Number of pages: 13
Pages: 38-50
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Maaseudun uusi aika
Volume: 22
Issue number: 3
ISSN (Print): 1237-413X
Original language: Finnish
Research output: Scientific - peer-review » Article

Kuka päättää vesihuollon tulevaisuudesta? (Who decides on the future of the water supply?)

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering, Department of Civil Engineering, Former organisation of the author
Authors: Rajala, R., Juuti, P., Katko, T.
Number of pages: 2
Pages: 33-34
Publication date: 2014
Peer-reviewed: No

Publication information
Journal: Vesitalous
Liite 6: Yleistä kaivannaisjätealueista ja patoturvallisuudesta

General information
State: Published
Ministry of Education publication type: D2 Article in professional manuals or guides or professional information systems or text book material
Organisations: Department of Civil Engineering, Research group: Earth Constructions
Authors: Leppänen, M., Välisalo, T. (ed.), Laasonen, J.
Publication date: 2014

Host publication information
Title of host publication: Kaivosten stressitesti 2013
Publisher: Ympäristöministeriö

Publication series
Name: Ympäristöministeriön raportteja
Links:
http://www.ym.fi/fi-FI/Ajankohtaista/Julkaisut/YMra_22014_Kaivosten_stressitestit_2013%2828221%29
Research output: Professional › Chapter

Long-term thermophilic mono-digestion of rendering wastes and co-digestion with potato pulp

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Bayr, S., Ojanperä, M., Kaparaju, P., Rintala, J.
Number of pages: 7
Pages: 1853-1859
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Waste Management
Volume: 34
Issue number: 10
ISSN (Print): 0956-053X
Ratings:
Scopus rating (2016): CiteScore 4 SJR 1.354 SNIP 2.044
Scopus rating (2015): SJR 1.739 SNIP 2.256 CiteScore 4.33
Scopus rating (2014): SJR 1.777 SNIP 2.482 CiteScore 3.43
Scopus rating (2013): SJR 1.822 SNIP 2.435 CiteScore 3.39
Scopus rating (2012): SJR 1.611 SNIP 2.184 CiteScore 2.91
Scopus rating (2011): SJR 1.698 SNIP 2.085 CiteScore 2.99
Scopus rating (2010): SJR 1.555 SNIP 1.78
Scopus rating (2009): SJR 1.502 SNIP 1.899
Scopus rating (2008): SJR 1.378 SNIP 2.13
Metabolic engineering of Acinetobacter baylyi ADP1 for improved growth on gluconate and glucose

A high growth rate in bacterial cultures is usually achieved by optimizing growth conditions, but metabolism of the bacterium limits the maximal growth rate attainable on the carbon source used. This limitation can be circumvented by engineering the metabolism of the bacterium. Acinetobacter baylyi has become a model organism for studies of bacterial metabolism and metabolic engineering due to its wide substrate spectrum and easy-to-engineer genome. It produces naturally storage lipids, such as wax esters, and has a unique gluconate catabolism as it lacks a gene for pyruvate kinase. We engineered the central metabolism of A. baylyi ADP1 more favorable for gluconate catabolism by expressing the pyruvate kinase gene (pykF) of Escherichia coli. This modification increased growth rate when cultivated on gluconate or glucose as a sole carbon source in a batch cultivation. The engineered cells reached stationary phase on these carbon sources approximately twice as fast as control cells carrying an empty plasmid and produced similar amount of biomass. Furthermore, when grown on either gluconate or glucose, pykF expression did not lead to significant accumulation of overflow metabolites and consumption of the substrate remained unaltered. Increased growth rate on glucose was not accompanied with decreased wax ester production, and the pykF-expressing cells accumulated significantly more of these storage lipids with respect to cultivation time.
Modelling fume deposit growth in recovery boilers: effect of flue gas and deposit temperature

The high ash content of black liquor causes fouling problems in the Kraft recovery boiler. The ash-forming elements condense into submicron-sized fume particles in the superheater area and the boiler bank and can deposit on heat-transfer surfaces. The fume deposits can then lower heat-transfer rate, plug flue gas flow, and expose surfaces to corrosion. This paper presents the results of a sensitivity analysis obtained using a CFD (computational fluid dynamics)-based sub-model of the formation of fume particles and deposits, showing how flue gas and deposit surface temperatures affect instantaneous fume deposit growth. The results indicate that fume deposit growth is a self-limiting process because the growth rate decreases as the deposit surface temperature increases. On the other hand, increasing the flue gas temperature increases the fume deposition rate when the element release factors are kept constant.
Osuuskunnat mukaan infrastruktuuripolitiikkaan

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O., Anttiroiko, A.
Number of pages: 1
Pages: 54-54
Publication date: 2014
Peer-reviewed: Unknown

Publication information
Journal: Osuustoiminta
Volume: 105
Issue number: 5
ISSN (Print): 1236-4835
Original language: Finnish

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2015-01-15
Source: researchoutputwizard
Source-ID: 440
Research output: Professional › Article

Simultaneous detection of three antiviral and four antibiotic compounds in source-separated urine with liquid chromatography

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Pynnönen, S., Tuhkanen, T. A.
Number of pages: 9
Pages: 219-227
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Separation Science
Volume: 37
Issue number: 3
ISSN (Print): 1615-9306
Ratings:
Stabilization of fine fraction from landfill mining in leach bed reactor

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Chemistry and Bioengineering, Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Mönkäre, T., Palmroth, M., Rintala, J.
Number of pages: 11
Pages: 1-11
Publication date: 2014

Host publication information
Publisher: CISA Publishers
ISBN (Print): 978-88-6265-031-1

The effect of torrefaction on the chlorine content and heating value of eight woody biomass samples
This study examined and compared the effect of torrefaction on the heating value, elementary composition, and chlorine content of eight woody biomasses. The biomass samples were torrefied in a specially constructed batch reactor at 260 °C for 30, 60, and 90 min. The original biomasses as well as the solid, liquid, and gaseous torrefaction reaction products were analyzed separately. The higher heating values (HHV) of dry samples increased from 19.5–21.0 MJ kg⁻¹ to 21.2–23.2 MJ kg⁻¹ during 60 min of torrefaction. In all samples, the HHV increased 9 % on average. Furthermore, the effect of torrefaction time on the biomass HHV was studied. Measurements showed that after a certain point, increasing the torrefaction time had no effect on the samples' HHV. This optimal torrefaction time varied considerably between the
samples. For more reactive biomasses, i.e., birch and aspen, the optimal torrefaction time was close to 30 min whereas the HHV of less reactive biomasses, e.g., stumps, increased markedly even after a 60-min torrefaction. Another significant observation was that torrefaction reduced the chlorine content of the biomass samples. The chlorine concentration of the solid product dropped in most samples from the original by half or even as much as 90%. The highest relative chlorine decrease was observed in the Eucalyptus dunnii sample, which also had the highest chlorine content of all the studied biomasses. The relative carbon content of the biomass samples increased during torrefaction as the average elementary composition changed from $\text{CH}_{0.123}\text{O}_{0.827}$ to $\text{CH}_{0.105}\text{O}_{0.674}$ after a 60-min torrefaction.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Power Plant and Combustion Technology, Urban circular bioeconomy (UrCirBio)
Authors: Keipi, T., Tolvanen, H., Kokko, L., Raiko, R.
Number of pages: 8
Pages: 232-239
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Biomass & Bioenergy
Volume: 66
ISSN (Print): 0961-9534
Ratings:
Scopus rating (2016): CiteScore 3.71 SJR 1.188 SNIP 1.368
Scopus rating (2015): SJR 1.521 SNIP 1.615 CiteScore 4.03
Scopus rating (2014): SJR 1.888 SNIP 1.985 CiteScore 4.36
Scopus rating (2013): SJR 1.678 SNIP 1.823 CiteScore 4.42
Scopus rating (2012): SJR 1.545 SNIP 1.743 CiteScore 3.66
Scopus rating (2011): SJR 1.793 SNIP 2.283 CiteScore 4.74
Scopus rating (2010): SJR 1.931 SNIP 2.254
Scopus rating (2009): SJR 1.743 SNIP 2.187
Scopus rating (2008): SJR 1.609 SNIP 2.073
Scopus rating (2007): SJR 1.454 SNIP 1.77
Scopus rating (2006): SJR 1.292 SNIP 1.954
Scopus rating (2005): SJR 1.226 SNIP 1.398
Scopus rating (2004): SJR 1.037 SNIP 1.637
Scopus rating (2003): SJR 0.693 SNIP 1.312
Scopus rating (2002): SJR 0.442 SNIP 0.764
Scopus rating (2001): SJR 0.468 SNIP 0.994
Scopus rating (2000): SJR 0.429 SNIP 0.903
Scopus rating (1999): SJR 0.431 SNIP 1.105
Original language: English
DOIs:
10.1016/j.biombioe.2014.02.015

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-05-28<br/>Publisher name: Pergamon; Imprint: Elsevier
Source: researchoutputwizard
Source-ID: 698
Research output: Scientific - peer-review › Article

Vieraskynä : Vesialan osaamista kehitettävä yhteiskunnan tarpeista

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Number of pages: 1
Water services and cooperation

Opening of the seminar

Geo + Ympäristö = Ympäristögeoteknikka?
Bioenergy consumption and biogas potential in Cambodian households

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Mustonen, S., Raiko, R., Luukkanen, J.
Number of pages: 17
Pages: 1875-1892
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Sustainability
Volume: 5
Issue number: 5
ISSN (Print): 2071-1050
Ratings:
Scopus rating (2016): CiteScore 1.96 SJR 0.524 SNIP 0.911
Scopus rating (2015): SJR 0.473 SNIP 0.926 CiteScore 1.78
Scopus rating (2014): SJR 0.499 SNIP 1.048 CiteScore 1.52
Scopus rating (2013): SJR 0.539 SNIP 1.247 CiteScore 1.43
Scopus rating (2012): SJR 0.486 SNIP 0.809 CiteScore 1.18
Scopus rating (2011): SJR 0.27 SNIP 0.501 CiteScore 0.65
Scopus rating (2010): SJR 0.156 SNIP 0.388
Original language: English
DOIs:
10.3390/su5051875

Bibliographical note
ei vielâ UT 2013-09-19<br/>Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-09-29<br/>Publisher name: MDPI AG
Source: researchoutputwizard
Source-ID: 2963
Research output: Scientific - peer-review → Article

Biofiltration of odours in dry toilet air

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Number of pages: 7
Pages: 291-297
Publication date: 2013

Host publication information
Title of host publication: Biotechniques for air pollution control and bioenergy
Place of publication: Paris
Publisher: Presses des MINES
Editor: Malhautier, L.
ISBN (Print): 978-2-35671-058-1

Bibliographical note
Biotechniques 2013, Biotechniques for Air Pollution Control & Bioenergy, 10-13 September 2013, Nimes, France<br/>Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-10-29
Source: researchoutputwizard
Source-ID: 3086
Research output: Scientific - peer-review → Chapter
Biological methane oxidation in landfill cover soil - constrained by concurrent decomposition processes and sulphide oxidation?

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Maanoja, S., Palmroth, M., Rintala, J.
Number of pages: 8
Pages: 65-72
Publication date: 2013

Host publication information
Title of host publication: Biotechniques for air pollution control and bioenergy
Place of publication: Paris
Publisher: Presses des MINES
Editor: Luc, M.
ISBN (Print): 978-2-35671-058-1

Bibliographical note
Biotechniques 2013, Biotechniques for Air Pollution Control & Bioenergy, 10-13 September 2013, Nimes, France<br/>Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-10-29
Source: researchoutputwizard
Source-ID: 2841
Research output: Scientific - peer-review › Chapter

CFD-modeling of fume formation in kraft recovery boilers
A computational fluid dynamics (CFD) model was developed to simulate alkali metal chemistry and fume particle formation in a kraft recovery boiler. The modeling results were partially validated against previously obtained field measurements. The model provides information about fume composition, chlorine and potassium enrichment factors, and particle mass concentration at different locations in the boiler.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Power Plant and Combustion Technology, Urban circular bioeconomy (UrCirBio), Valmet Technologies Oy, University of Toronto, Canada
Authors: Leppänen, A., Välimäki, E., Oksanen, A., Tran, H.
Number of pages: 8
Pages: 25-32
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: TAPPI Journal
Volume: 12
Issue number: 3
ISSN (Print): 0734-1415
Ratings:
Scopus rating (2016): SJR 0.406 SNIP 0.494
Scopus rating (2015): SJR 0.441 SNIP 0.741
Scopus rating (2014): SJR 0.44 SNIP 0.625
Scopus rating (2013): SJR 0.429 SNIP 0.722
Scopus rating (2012): SJR 0.326 SNIP 0.809
Scopus rating (2011): SJR 0.545 SNIP 1.05
Scopus rating (2010): SJR 0.737 SNIP 1.353
Scopus rating (2009): SJR 1.156 SNIP 0.755
Scopus rating (2008): SJR 0.838 SNIP 1.091
Scopus rating (2007): SJR 1.561 SNIP 1.188
Scopus rating (2006): SJR 1.205 SNIP 1.322
Developing community water services and cooperation in Finland and the South

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S., Rautavaara, A.
Number of pages: 5
Pages: 240-244
Publication date: 2013

**Host publication information**
Title of host publication: Free Flow - Researching Water Security Through Cooperation
Publisher: United Nations Educational, Scientific and Cultural Organization; Unesco Publishing; Tudor Rose
Editors: Griffiths, J., Lambert, R.
ISBN (Print): 978-92-3-104256-0

**Bibliographical note**
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: researchoutputwizard
Source-ID: 2518
Research output: Professional › Article
FSES 2013, Finnish Conference of Environmental Sciences, 2-3 May 2013, Tampere, Finland. Proceedings

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Department of Chemistry and Bioengineering
Authors: Pynnönen, S. (ed.), Tuhkanen, T. (ed.)
Number of pages: 156
Publication date: 2013

Publication information
Place of publication: Tampere
Publisher: Tampere University of Technology
Original language: English

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-06-29<br/>Publisher name: Elsevier Ltd.
Source: researchoutputwizard
Source-ID: 3549
Research output: Scientific - peer-review › Article

Gestao e organizacao dos servicso de saneamento : Abordagens europeias.

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Seppälä, O., Katko, T. S.
Impact of heavy metals on denitrification of simulated mining wastewaters

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Zou, G., Ylinen, A., Di Capua, F., Papirio, S., Lakaniemi, A., Puhakka, J.
Number of pages: 4
Pages: 500-503
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Advanced Materials Research
Volume: 825
ISSN (Print): 1022-6680
Ratings:
Scopus rating (2016): SJR 0.12 SNIP 0.154
Scopus rating (2015): SJR 0.115 SNIP 0.106 CiteScore 0.08
Scopus rating (2014): SJR 0.141 SNIP 0.171 CiteScore 0.09
Scopus rating (2013): SJR 0.143 SNIP 0.203 CiteScore 0.11
Scopus rating (2012): SJR 0.136 SNIP 0.265 CiteScore 0.12
Scopus rating (2011): SJR 0.15 SNIP 0.385 CiteScore 0.19
Scopus rating (2010): SJR 0.155 SNIP 0.232
Scopus rating (2009): SJR 0.168 SNIP 0.254
Scopus rating (2008): SJR 0.169 SNIP 0.238
Scopus rating (2007): SJR 0.186 SNIP 0.657
Scopus rating (2006): SJR 0.251 SNIP 0.598
Original language: English
DOIs:
10.4028/www.scientific.net/AMR.825.500

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: Trans Tech Publications Ltd.
Source: researchoutputwizard
Integration of water and wastewater utilities

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Katko, T. S., Kurki, V. O., Juuti, P. S., Rajala, R. P., Seppälä, O. T.
Number of pages: 12
Pages: 29-40
Publication date: 2013

Host publication information
Title of host publication: Water Services Management and Governance: Lessons for a Sustainable Future
Publisher: IWA Publishing
Editors: Katko, T. S., Juuti, P. S., Schwartz, K., Rajala, R. P.
ISBN (Print): 978-1-78040-022-8
ISBN (Electronic): 978-1-78040-073-0

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-09-29
Source: researchoutputwizard
Research output: Scientific - peer-review › Article

Johtoja ja joukkuehenkeä

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O.
Number of pages: 3
Pages: 11-13
Publication date: 2013

Publication information
Journal: Vesitalous
Issue number: 3
ISSN (Print): 0505-3838
Original language: Finnish
Links:
http://www.vesitalous.fi

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-07-29
Source: researchoutputwizard
Source-ID: 2270
Research output: Professional › Article

Jätehuollon jakautuminen osamarkkinoihin ja yritystoiminta

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Kallio, O., Valkama, P., Siiitonen, P., Heino, O.
Number of pages: 15
Pages: 99-113
Publication date: 2013
Kylien palvelutuotantotedotyksistä erityisesti julkisten palvelujen näkökulmasta tarkasteltuna

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Chemistry and Bioengineering
Authors: Valkama, P., Heino, O., Salonen, A., Laukka, A.
Number of pages: 9
Publication date: 2013

Publication information
Place of publication: Tampere
Publisher: Maaseutupolitiikan yhteistyöryhmä, YTR
ISBN (Print): 978-952-227-782-4
ISBN (Electronic): 978-952-227-783-1
Original language: Finnish

Publication series
Name: Maaseutupolitiikan yhteistyöryhmän julkaisuja
Publisher: Maaseutupolitiikan yhteistyöryhmä, YTR
No.: 6
ISSN (Print): 1238-6464

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-12-12
Source: researchoutputwizard
Source-ID: 3635
Research output: Professional › Commissioned report

Kyläyhteisöt palvelukulutuksen alustana

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Chemistry and Bioengineering
Authors: Laukka, A., Heino, O., Valkama, P., Salonen, A.
Number of pages: 16
Publication date: 2013

Publication information
Place of publication: Tampere
Publisher: Maaseutupolitiikan yhteistyöryhmä, YTR
ISBN (Print): 978-952-227-782-4
Original language: Finnish

Publication series
Name: Maaseutupolitiikan yhteistyöryhmän julkaisuja
Publisher: Maaseutupolitiikan yhteistyöryhmä, YTR
No.: 6
ISSN (Print): 1238-6464

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-12-12
Source: researchoutputwizard
Source-ID: 2732
Research output: Professional › Commissioned report
Käänteiset infrastruktuurit ja integroiva infrastruktuuripoliitikka

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Anttiroiko, A., Heino, O.
Number of pages: 14
Pages: 30-43
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Yhdyskuntasuunnittelu
Volume: 51
Issue number: 3
ISSN (Print): 1459-6806
Original language: Finnish

Bibliographical note
Contribution: organisation=keb,FACT1=1
Portfolio EDEND: 2014-12-30
Publisher name: Yhdyskuntasuunnittelun Seura
Source: researchoutputwizard
Source-ID: 1932
Research output: Scientific - peer-review › Article

Käänteiset perusrakenteet : Suuntana hajautettu infrastruktuuripoliitikka?

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Former organisation of the author
Authors: Heino, O., Anttiroiko, A.
Number of pages: 3
Pages: 40-42
Publication date: 2013
Peer-reviewed: Unknown

Publication information
Journal: Kuntatekniikka
Issue number: 1
ISSN (Print): 1238-125X
Original language: Finnish
Links:
http://lehti.kuntatekniikka.fi/sites/default/files/KT0113-PDF-WWW-HQ.pdf

Bibliographical note
Contribution: organisation=keb,FACT1=1
Portfolio EDEND: 2013-07-29
Source: researchoutputwizard
Source-ID: 2272
Research output: Professional › Article

Managed aquifer recharge in community water supply: the Finnish experience and some international comparisons

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Life Cycle Effectiveness of the Built Environment (LCE@BE)
Authors: Kurki, V., Lipponen, A., Katko, T.
Number of pages: 16
Pages: 774-789
Publication date: 2013
Peer-reviewed: Yes
Nanoscale Surface Processing of Extrusion Coated Substrates with Atmospheric Plasma Technology

General information
State: Published
Organisations: Department of Materials Science, Research group: Paper Converting and Packaging, Engineering materials science and solutions (EMASS)
Authors: Lahti, J.
Publication date: 2013
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Paradigma alternativo : O papel das cooperativas e das autoridades locais

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Hukka, J. J., Katko, T. S.
Number of pages: 24
Pages: 214-237
Publication date: 2013

Host publication information
Title of host publication: Politica publica e gestao de servicios de saneamento
Place of publication: Belo Horizonte; Rio de Janeiro
Pollutants source control and health effects

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Kelishadi, R., Amin, M. M., Haghdoost, A. A., Gupta, A. K., Tuhkanen, T. A.
Number of pages: 2
Pages: 1-2
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Environmental and Public Health
Volume: 2013
Article number: 209739
ISSN (Print): 1687-9805
Ratings:
Scopus rating (2016): SJR 0.53 SNIP 0.867 CiteScore 1.52
Scopus rating (2015): SJR 1.198 SNIP 1.266 CiteScore 2.56
Scopus rating (2014): SJR 0.876 SNIP 0.898 CiteScore 1.94
Scopus rating (2013): SJR 0.548 SNIP 0.757 CiteScore 1.68
Scopus rating (2012): SJR 0.3 SNIP 0.448 CiteScore 0.83
Scopus rating (2011): SJR 0.235 SNIP 0.737 CiteScore 0.82
Scopus rating (2010): SJR 0.248 SNIP 0.103
Original language: English
DOI: 10.1155/2013/209739

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-11-29
Publisher name: Hindawi
Source: researchoutputwizard
Source-ID: 2539
Research output: Scientific - peer-review » Article

Prologue

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Former organisation of the author
Number of pages: 3
Publication date: 2013

Publication information
Publisher: IWA Publishing
ISBN (Print): 978-1-78040-022-8
ISBN (Electronic): 978-1-78040-073-0
Original language: English

Bibliographical note
Epilogue r=1592<br/>Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-09-29
Source: researchoutputwizard
Source-ID: 2442
Research output: Scientific - peer-review › Anthology

Pääkirjoitus : Vesihuoltolaitosten historiat imagon nostajana / Editorial : Relevance of history for current water services management and governance

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Number of pages: 3
Publication date: 2013
Peer-reviewed: No

Publication information
Journal: Ympäristöhistoria: Finnish Journal of Environmental History
Issue number: 2
ISSN (Print): 1799-6953
Original language: Finnish
Links:
http://www.uta.fi/yky/tutkimus/historia/projektit/iehg/Ymparistohistoria/No2

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-11-29<br/>Publisher name: IEHG
Source: researchoutputwizard
Source-ID: 2521
Research output: Scientific › Article

Päätelmät yhdyksuntajätehuollon markkinainnovaatioista - taustat, kiistat ja sovellukset

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Valkama, P., Heino, O., Kallio, O.
Number of pages: 12
Pages: 159-170
Publication date: 2013

Host publication information
Title of host publication: Markkinainnovaatiot yhdyksuntajätehuollossa : tutkimus jätehuoltopalvelujen markkinoiden evoluutioista, sovelluksista ja jännitteistä kunnallisen ja yksityisen sektorin rajapinnassa
Place of publication: Tampere
Publisher: Tampereen yliopisto, Johtamiskorkeakoulu
Editor: Valkama, P.
ISBN (Print): 978-951-44-9163-4
ISBN (Electronic): 978-951-44-9164-1
Links:

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-07-29
Source: researchoutputwizard
Source-ID: 3634
Research output: Scientific - peer-review › Chapter

Safety of lead water pipes: history and present

General information
State: Published
Sidosryhmien näkemykset jätehuollon markkinoistumisesta

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Kallio, O., Heino, O., Valkama, P., Autero, A.
Number of pages: 15
Pages: 144-158
Publication date: 2013

Host publication information
Title of host publication: Markkinainnovaatiot yhdyskuntajätehuollossa : tutkimus jätehuoltopalvelujen markkinoiden evolutiosta, soveluksista ja jännitteistä kunnallisen ja yksityisen sektorin rajapinnassa
Place of publication: Tampere
Publisher: Tampereen yliopisto, Johtamiskorkeakoulu
Editor: Valkama, P.
ISBN (Print): 978-951-44-9163-4
ISBN (Electronic): 978-951-44-9164-1
Links:

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-07-29
Source: researchoutputwizard
Source-ID: 2473
Research output: Scientific - peer-review › Chapter

Technology development theories and water services evolution

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Antila, K., Katko, T. S., Mattila, H.
Number of pages: 15
Pages: 13-27
Publication date: 2013

Host publication information
Title of host publication: Water Services Management and Governance : Lessons for a Sustainable Future
Publisher: IWA Publishing
Editors: Katko, T. S., Juuti, P. S., Schwartz, K., Rajala, R. P.
ISBN (Print): 978-1-78040-022-8
ISBN (Electronic): 978-1-78040-073-0

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-09-29
Source: researchoutputwizard
Source-ID: 3724
Research output: Scientific - peer-review › Chapter
Testing activity-based costing to large-scale combined heat and power plant using bioenergy

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Korpunen, H., Raiko, R.
Number of pages: 11
Pages: 1-11
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: International Journal of Energy Research
ISSN (Print): 0363-907X
Ratings:
Scopus rating (2016): SJR 0.739 SNIP 0.857 CiteScore 2.44
Scopus rating (2015): SJR 0.917 SNIP 1.066 CiteScore 2.52
Scopus rating (2014): SJR 1.06 SNIP 1.35 CiteScore 2.56
Scopus rating (2013): SJR 1.068 SNIP 1.65 CiteScore 2.71
Scopus rating (2012): SJR 1.095 SNIP 1.421 CiteScore 2.2
Scopus rating (2011): SJR 1.03 SNIP 1.361 CiteScore 2.24
Scopus rating (2010): SJR 1.128 SNIP 1.353
Scopus rating (2009): SJR 1.063 SNIP 1.206
Scopus rating (2008): SJR 0.608 SNIP 0.78
Scopus rating (2007): SJR 0.59 SNIP 1.007
Scopus rating (2006): SJR 0.745 SNIP 0.825
Scopus rating (2005): SJR 1.054 SNIP 0.849
Scopus rating (2004): SJR 0.888 SNIP 0.953
Scopus rating (2003): SJR 0.6 SNIP 0.631
Scopus rating (2002): SJR 0.485 SNIP 0.562
Scopus rating (2001): SJR 0.765 SNIP 0.758
Scopus rating (2000): SJR 0.566 SNIP 0.638
Scopus rating (1999): SJR 0.737 SNIP 0.71
Original language: English
DOIs:
10.1002/er.3047

Bibliographical note
ei vielä UT 2013-09-19 : This article was published online on [29 April 2013]. Errors were subsequently identified in Table V. This notice is included in the online and print versions to indicate that both have been corrected [14 June 2013]

Tuotanto- ja operointi-innovaatiot - case vesihuolto

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O.
**Vesihuollon kehitys ja yhteiskunnallinen merkitys : Hapertuvatko hanat?**

**General information**
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Number of pages: 3
Pages: 14-16
Publication date: 2013
Peer-reviewed: Unknown

**Publication information**
Journal: Kuntatekniikka
Issue number: 5
ISSN (Print): 1238-125X
Original language: Finnish

**Bibliographical note**
Contribution: organisation=keb,FACT1=1
Source: researchoutputwizard
Source-ID: 2519
Research output: General public › Article

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**Vesihuollossa muhil aikapommi**

**General information**
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Number of pages: 4
Pages: 37-40
Publication date: 2013
Peer-reviewed: Unknown

**Publication information**
Journal: Kanava
Issue number: 8
ISSN (Print): 0355-0303
Original language: Finnish

**Bibliographical note**
Contribution: organisation=keb,FACT1=1
Source: researchoutputwizard
Source-ID: 2517
Research output: Professional › Article

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**Vesihuolto osana näkymätöntä kaupunkia**

**General information**
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Number of pages: 4
Pages: 18-21
Publication date: 2013
Peer-reviewed: Unknown
Vesihuoltotoimintojen ulkoistaminen Suomessa

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O., Pietilä, P.
Number of pages: 6
Publication date: 2013

Publication information
Place of publication: Espoo
Publisher: VALTION TEKNILLINEN TUTKIMUSKESKUS
ISBN (Print): 978-951-38-7903-7
Original language: Finnish
Links:

Bibliographical note
Contribution: organisation=keb,FACT1=1
Portfolio EDEND: 2013-07-29
Source: researchoutputwizard
Source-ID: 2274
Research output: Professional › Commissioned report

Waste water treatment by multi-stage biofilm processes: Results of the VESITURVA project

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Chemistry and Bioengineering
Authors: Mononen, T., Coloma, S., Romantschuk, M., Vikman, M., Kapanen, A., Lehtonen, A., Saario, E., Itävaara, M., Malinen, E., Kostia, S., Tuhkanen, T.
Number of pages: 74
Publication date: 2013

Publication information
Place of publication: Espoo
Publisher: VALTION TEKNILLINEN TUTKIMUSKESKUS
ISBN (Print): 978-951-38-7991-4
Original language: English

Publication series
Name: VTT Technology
Publisher: Valtion teknillinen tutkimuskeskus
No.: 98
ISSN (Print): 2242-1211
ISSN (Electronic): 2242-122X
Links:

Bibliographical note
Yhdyskuntajätehuollon markkinainnovaatiot tutkimuskaupungeissa

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Kallio, O., Heino, O., Valkama, P., Autero, A.
Number of pages: 30
Pages: 114-143
Publication date: 2013

Host publication information
Title of host publication: Markkinainnovaatiot yhdyskuntajätehuollossa : tutkimus jätehuoltopalvelujen markkinoiden evoluutiosta, sovelluksista ja jännitteistä kunnallisen ja yksityisen sektorin rajapinnassa
Place of publication: Tampere
Publisher: Tampereen yliopisto, Johtamiskorkeakoulu
Editor: Valkama, P.
ISBN (Print): 978-951-44-9163-4
ISBN (Electronic): 978-951-44-9164-1
Links:

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>
Source: researchoutputwizard
Source-ID: 2474
Research output: Scientific - peer-review › Chapter

Education, Research and Capacity Building for Water Services

General information
State: Published
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Publication date: 20 Sep 2012
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Focus and Change of Water Management in Finland – Analysis of Vesitalous Journal, 1960-2009

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering, Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Jaatinen, T. T. O., Katko, T. S., Pynnönen, S. T., Vihanta, J. S.
Pages: 10-32
Publication date: 14 Sep 2012
Peer-reviewed: Unknown

Publication information
Journal: Ympäristöhistoria: Finnish Journal of Environmental History
Issue number: 3
ISSN (Print): 1799-6953
Original language: English
Links:
http://www.uta.fi/yky/tutkimus/historia/projektit/iehg/Ymparistohistoria/No32012/YFJEH%202003%202013%20webo.pdf
Accidents and close call situations connected to the use of mobile phones

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Pääkkönen, R.
Pages: 75-82
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Accident Analysis and Prevention
Volume: 45
ISSN (Print): 0001-4575
Ratings:
Scopus rating (2016): SJR 1.49 SNIP 1.97 CiteScore 3.24
Scopus rating (2015): SJR 1.206 SNIP 1.808 CiteScore 2.63
Scopus rating (2014): SJR 1.19 SNIP 2.067 CiteScore 2.79
Scopus rating (2013): SJR 1.359 SNIP 2.688 CiteScore 3.2
Scopus rating (2012): SJR 1.3 SNIP 2.238 CiteScore 2.56
Scopus rating (2011): SJR 0.922 SNIP 2.008 CiteScore 2.61
Scopus rating (2010): SJR 1.146 SNIP 2.356
Scopus rating (2009): SJR 1.203 SNIP 1.848
Scopus rating (2008): SJR 1.276 SNIP 2.228
Scopus rating (2007): SJR 1.109 SNIP 2.064
Scopus rating (2006): SJR 1.5 SNIP 2.244
Scopus rating (2005): SJR 1.008 SNIP 2.387
Scopus rating (2004): SJR 0.899 SNIP 1.947
Scopus rating (2003): SJR 0.785 SNIP 1.933
Scopus rating (2002): SJR 0.614 SNIP 1.443
Scopus rating (2001): SJR 0.613 SNIP 1.368
Scopus rating (2000): SJR 0.756 SNIP 1.146
Scopus rating (1999): SJR 0.588 SNIP 1.2
Original language: English
DOIs:
10.1016/j.aap.2011.11.016

Bibliographical note
Contribution: organisation=epr,FACT1=1<br/>Publisher name: Elsevier Ltd
Source: researchoutputwizard
Source-ID: 4534
Research output: Scientific - peer-review › Article

A comparison of occupational electric field exposures during working tasks at 400 kV and 110 kV substations

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Kuisti, H., Pääkkönen, R., Gobba, F.
Publication date: 2012

Host publication information
Title of host publication: Proceedings - 7th International Workshop on Biological Effects of Electromagnetic Fields, 7th IWSBEEMF, 8 - 12 October 2012, Valletta, Malta
Publisher: Electromagnetic Research Group - EMRG (Malta); Department of Physics, University of Malta
Cardiac Pacemakers in Electric and Magnetic Fields of 400-kV Power Lines

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Kuisti, H., Elovaara, J., Virtanen, V.
Pages: 422-430
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: PACE: Pacing and Clinical Electrophysiology
Volume: 35
Issue number: 4
ISSN (Print): 0147-8389
Ratings:
Scopus rating (2016): SJR 0.813 SNIP 0.695 CiteScore 1.26
Scopus rating (2015): SJR 0.716 SNIP 0.636 CiteScore 1.1
Scopus rating (2014): SJR 0.823 SNIP 0.715 CiteScore 1.21
Scopus rating (2013): SJR 0.939 SNIP 0.764 CiteScore 1.27
Scopus rating (2012): SJR 1.151 SNIP 0.862 CiteScore 1.59
Scopus rating (2011): SJR 0.936 SNIP 0.782 CiteScore 1.43
Scopus rating (2010): SJR 0.89 SNIP 0.768
Scopus rating (2009): SJR 0.895 SNIP 0.951
Scopus rating (2008): SJR 0.833 SNIP 0.88
Scopus rating (2007): SJR 1.111 SNIP 0.966
Scopus rating (2006): SJR 0.865 SNIP 0.788
Scopus rating (2005): SJR 0.743 SNIP 0.834
Scopus rating (2004): SJR 0.711 SNIP 0.822
Scopus rating (2003): SJR 0.668 SNIP 0.89
Scopus rating (2002): SJR 0.687 SNIP 0.785
Scopus rating (2001): SJR 0.869 SNIP 0.8
Scopus rating (2000): SJR 0.888 SNIP 0.895
Scopus rating (1999): SJR 0.805 SNIP 0.888
Original language: Finnish
DOIs: 10.1111/j.1540-8159.2011.03327.x

Career paths of experts on water supply and sanitation services

General information
CFD-Modeling of Fume Formation in Kraft Recovery Boilers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering, Research group: Power Plant and Combustion Technology, Urban circular bioeconomy (UrCirBio), Valmet Technologies Oy, University of Toronto, Canada
Authors: Leppänen, A., Välimäki, E., Oksanen, A., Tran, H.
Publication date: 2012

Host publication information
Title of host publication: TAPPI PEERS Conference Proceedings 14.-18.10.2012, Savannah, USA
Publisher: TAPPI

Publication series
Name: TAPPI PEERS Conference
Links:

Bibliographical note
ei ut-numeroa 21.8.2013<br/>Contribution: organisation=epr,FACT1=1<br/>Publisher name: TAPPI
Source: researchoutputwizard
Source-ID: 4695
Research output: Scientific - peer-review › Conference contribution

Coal char combustion in O2/N2 and O2/CO2 conditions in a drop tube reactor: an optical study

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering, Urban circular bioeconomy (UrCirBio)
Authors: Rodríguez Avila, M., Honkanen, M., Raiko, R., Oksanen, A.
Number of pages: 22
Pages: 1-22
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Industrial Combustion
Comparing the energy required for fine grinding torrefied and fast heat treated pine

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering, Urban circular bioeconomy (UrCirBio)
Authors: Kokko, L., Tolvanen, H., Hämäläinen, K., Raiko, R.
Pages: 219-223
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Biomass & Bioenergy
Volume: 42
Issue number: Jul
ISSN (Print): 0961-9534
Ratings:
Scopus rating (2016): CiteScore 3.71 SJR 1.188 SNIP 1.368
Scopus rating (2015): SJR 1.521 SNIP 1.615 CiteScore 4.03
Scopus rating (2014): SJR 1.888 SNIP 1.985 CiteScore 4.36
Scopus rating (2013): SJR 1.678 SNIP 1.823 CiteScore 4.42
Scopus rating (2012): SJR 1.545 SNIP 1.743 CiteScore 3.66
Scopus rating (2011): SJR 1.793 SNIP 2.283 CiteScore 4.74
Scopus rating (2010): SJR 1.931 SNIP 2.254
Scopus rating (2009): SJR 1.743 SNIP 2.187
Scopus rating (2008): SJR 1.609 SNIP 2.073
Scopus rating (2007): SJR 1.454 SNIP 1.77
Scopus rating (2006): SJR 1.292 SNIP 1.954
Scopus rating (2005): SJR 1.226 SNIP 1.398
Scopus rating (2004): SJR 1.037 SNIP 1.637
Scopus rating (2003): SJR 0.693 SNIP 1.312
Scopus rating (2002): SJR 0.442 SNIP 0.764
Scopus rating (2001): SJR 0.468 SNIP 0.994
Scopus rating (2000): SJR 0.429 SNIP 0.903
Scopus rating (1999): SJR 0.431 SNIP 1.105
Original language: English
DOIs:
10.1016/j.biombioe.2012.03.008

Bibliographical note
Contribution: organisation=epr,FACT1=1
Publisher name: Elsevier Ltd.
Source: researchoutputwizard
Source-ID: 4515
Research output: Scientific - peer-review › Article
Environmental impact of micropollutants present in urine

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Chemistry and Bioengineering
Authors: Pynnönen, S., Tuhkanen, T.
Number of pages: 8
Pages: 1-8
Publication date: 2012

Host publication information
Title of host publication: Dry Toilet Conference 2012, 4th International Dry Toilet Conference, Full Papers, 22-24 August 2012, Tampere, Finland
Place of publication: Helsinki
Publisher: Global Dry Toilet Association of Finland

Publication series
Name: International Dry Toilet Conference
Links:

Bibliographical note
ei ut-numeroa 28.8.2013<br/>Contribution: organisation=keb bio,FACT1=1<br/>Publisher name: Global Dry Toilet Association of Finland
Examples of using the moodle virtual learning environment for teaching technical university students

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Gonzalez-Sosa, J., Tepsa, K.
Pages: 981-990
Publication date: 2012

Host publication information
Title of host publication: EDULEARN12 Proceedings, 4th International Conference on Education and New Learning Technologies, 2-4 July, 2012, Barcelona, Spain
Place of publication: Barcelona
Publisher: International Association of Technology, Education and Development IATED
Editors: Gomez Chova, L., Candel Torres, I., Lopez Martinez, A.
ISBN (Print): 978-84-695-3491-5

Publication series
Name: International Conference on Education and New Learning Technologies

Bibliographical note
ei ut-numeroa 19.8.2013<br/>Contribution: organisation=epr,FACT1=1<br/>Publisher name: International Association of Technology, Education and Development IATED
Source: researchoutputwizard
Source-ID: 4529
Research output: Scientific - peer-review » Conference contribution

Examples to Reduce the EMF Generated by HV Power Transmission Lines of Different Design

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Okun, A., Korpinen, L.
Publication date: 2012

Host publication information
Title of host publication: Proceedings - 7th International Workshop on Biological Effects of Electromagnetic Fields, 7th IWSBEEMF, 8 - 12 October 2012, Valletta, Malta
Publisher: Electromagnetic Research Group - EMRG (Malta); Departmet of Physics, University of Malta

Publication series
Name: International Workshop on Biological Effects of Electromagnetic Fields
Links:
http://www.um.edu.mt/events/emf2012/proceedings

Bibliographical note
ei ut-numeroa 27.8.2013<br/>Contribution: organisation=epr,FACT1=1<br/>Publisher name: Electromagnetic Research Group - EMRG (Malta); Departmet of Physics, University of Malta
Source: researchoutputwizard
Source-ID: 4979
Research output: Scientific - peer-review » Conference contribution

Experiences of integrating MSc student research projects in the "electromagnetic fields and health" area

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Exposure to Extremely Low Frequency Magnetic Fields: a Personal Monitoring Study in a Large Group of Workers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Gobba, F., Rossi, P., Contessa, G. M., Korpinen, L.
Pages: 63-64
Publication date: 2012

Host publication information
Title of host publication: II National Conference ICEmB 27.-29.6.2012, Bologna, Italy
Place of publication: Genova
Publisher: The Inter-university research Centre into Interactions between Electromagnetic fields and Biosystems ICEmB

Publication series
Name: National Conference ICEmB
Links:
http://www.icemb.org/bologna/dosimetria/DOS4_GobbaICEmB_BO12def.pdf

Bibliographical note
ei ut-numeroa 13.8.2013<br/>Contribution: organisation=epr,FACT1=1<br/>Publisher name: The Inter-university research Centre into Interactions between Electromagnetic fields and Biosystems ICEmB
Source: researchoutputwizard
Source-ID: 4094
Research output: Scientific - peer-review › Conference contribution

Gender comparison - The university students' exam results in the environmental and energy area

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Pitkänen, A., Raiko, R., Korpinen, L.
Pages: 3299-3308
Publication date: 2012

Host publication information
Title of host publication: INTED 2012 Proceedings, 6th International Technology, Education and Development Conference, March 5th-7th, 2012, Valencia, Spain
Place of publication: Spain
Impacts of changing operational parameters of in situ chemical oxidation (ISCO) on removal of aged PAHs from soil

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Cajal-Marinosa, P., de la Calle, R., Rivas, F. J., Tuhkanen, T.
Pages: 429-436
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Journal of Advanced Oxidation Technologies
Volume: 15
Issue number: 2
ISSN (Print): 1203-8407
Ratings:
Scopus rating (2016): SJR 0.231 SNIP 0.429 CiteScore 0.78
Scopus rating (2015): SJR 0.293 SNIP 0.359 CiteScore 0.83
Scopus rating (2014): SJR 0.35 SNIP 0.5 CiteScore 1.06
Scopus rating (2013): SJR 0.412 SNIP 0.686 CiteScore 1.33
Scopus rating (2012): SJR 0.411 SNIP 0.48 CiteScore 0.85
Scopus rating (2011): SJR 0.336 SNIP 0.395 CiteScore 0.82
Scopus rating (2010): SJR 0.339 SNIP 0.355
Scopus rating (2009): SJR 0.311 SNIP 0.395
Scopus rating (2008): SJR 0.229 SNIP 0.308
Scopus rating (2007): SJR 0.227 SNIP 0.466
Scopus rating (2006): SJR 0.264 SNIP 0.717
Scopus rating (2005): SJR 0.236 SNIP 0.932
Original language: English

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Publisher name: Science & Technology Integration
Source: researchoutputwizard
Source-ID: 3951
Research output: Scientific - peer-review › Article

Insentiivit julkisen sektorin innovaatiotoiminnan edistämisen välineinä. Esimerkkeinä Georgian osavaltion palvelu-uudistus

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Anttiroiko, A., Heino, O.
Number of pages: 8
Measurers’ Exposure to Extremely Low Frequency Magnetic Fields at 400 kV Substations

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Kuisti, H., Tarao, H., Pääkkönen, R.
Pages: 282-285
Publication date: 2012

Host publication information
Title of host publication: PIERS 2012 Moscow Proceedings, August 19-23, 2012, Moscow, Russia
Publisher: Electromagnetics Academy
ISBN (Print): 978-1-934142-22-6

Publication series
Name: Progress in Electromagnetics Research Symposium
ISSN (Print): 1559-9450
ISSN (Electronic): 1559-9450
Links:
http://www.piers.org

Bibliographical note
ei ut-numeroa 19.8.2013<br/>Contribution: organisation=epr,FACT1=1<br/>Portfolio EDEND: 2013-07-29
Publisher name: Electromagnetics Academy
Source: researchoutputwizard
Source-ID: 4533
Research output: Scientific - peer-review › Conference contribution

Metering the quality of water supply and sewage network maintenance services

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Chemistry and Bioengineering
Authors: Välisalo, T., Heino, O., Luomanen, T.
Number of pages: 9
Pages: 1-9
Publication date: 2012

Host publication information
Title of host publication: 2012 IFME World Congress on Municipal Engineering. Sustainable Communities, June 4-10, Helsinki, Finland
Publisher: International Federation of Municipal Engineering IFME

Publication series
Name: International Federation of Municipal Engineering World Congress
ISSN (Print): 0356-9403
Modeling fine particles and alkali metal compound behavior in a kraft recovery boiler

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Authors: Leppänen, A., Välimäki, E., Oksanen, A.
Number of pages: 6
Pages: 9-14
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: TAPPI Journal
Volume: 11
Issue number: 7
ISSN (Print): 0734-1415
Ratings:
Scopus rating (2016): SJR 0.406 SNIP 0.494
Scopus rating (2015): SJR 0.441 SNIP 0.741
Scopus rating (2014): SJR 0.44 SNIP 0.625
Scopus rating (2013): SJR 0.429 SNIP 0.722
Scopus rating (2012): SJR 0.326 SNIP 0.809
Scopus rating (2011): SJR 0.545 SNIP 1.05
Scopus rating (2010): SJR 0.737 SNIP 1.353
Scopus rating (2009): SJR 1.156 SNIP 0.755
Scopus rating (2008): SJR 0.838 SNIP 1.091
Scopus rating (2007): SJR 1.561 SNIP 1.188
Scopus rating (2006): SJR 1.205 SNIP 1.322
Scopus rating (2005): SJR 0.857 SNIP 0.97
Scopus rating (2004): SJR 1.185 SNIP 0.988
Scopus rating (2003): SJR 0.797 SNIP 0.709
Scopus rating (2002): SJR 1.275 SNIP 1.811
Scopus rating (2001): SJR 0.477 SNIP 1.424
Scopus rating (2000): SJR 0.652 SNIP 0.927
Scopus rating (1999): SJR 0.769 SNIP 0.791
Original language: English
Links:

Occupational Exposure to Electric Fields and Currents Associated With 110 kv Substation Tasks

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Part V: Comparative Analysis of the Omnipresent Water Fountains

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: School of Architecture, Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Hynynen, A. J., Juuti, P. S., Katko, T. S.
Pages: 137-212
Publication date: 2012

Host publication information
Title of host publication: Water Fountains in the Worldscape
Place of publication: Kangasala
Publisher: International Water History Association and Kehrämedia Inc.
Editors: Ari, J. H., Petri, S. J., Tapio, S. K.
ISBN (Print): 978-951-98151-8-3

Production of Electricity and Butanol from Microalgal Biomass in Microbial Fuel Cells

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Lakaniemi, A., Tuovinen, O. H., Puhakka, J. A.
Pages: 481-491
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: BioEnergy Research
Volume: 5
Issue number: 2
ISSN (Print): 1939-1234
Ratings:
Scopus rating (2016): SJR 0.943 SNIP 0.932 CiteScore 2.64
Scopus rating (2015): SJR 1.317 SNIP 1.285 CiteScore 3.35
Scopus rating (2014): SJR 1.453 SNIP 1.344 CiteScore 3.64
Scopus rating (2013): SJR 1.162 SNIP 1.384 CiteScore 3.66
Scopus rating (2012): SJR 1.362 SNIP 1.645 CiteScore 4.23
Scopus rating (2011): SJR 1 SNIP 1.435 CiteScore 3.16
Scopus rating (2010): SJR 0.458 SNIP 0.671
Original language: English
DOIs: 10.1007/s12155-012-9186-2
Removal of odours in dry toilets by biofiltration

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Chemistry and Bioengineering
Authors: Palmroth, M., Kolha, V., Ramos Garcia, A., Perrier, L., Richter, C., Tuhkanen, T.
Number of pages: 4
Pages: 1-4
Publication date: 2012

Host publication information
Title of host publication: ECO STP, EcoTechnologies for Wasterwater Treatment, Technical, Environmental & Economic Challenges, Santiago de Compostela, Spain, 25-27 June 2012
Publisher: International Water Association IWA
ISBN (Print): 978-84-695-3605-6

Publication series
Name: EcoTechnologies for Wasterwater Treatment, IWA International Conference

Bibliographical note
ei ut-numeroa 27.8.2013<br/>Contribution: organisation=keb bio,FACT1=1<br/>Publisher name: International Water Association IWA
Source: researchoutputwizard
Source-ID: 5010
Research output: Scientific - peer-review › Conference contribution

"Rocky Fountains" of Keciören, Turkey

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Pages: 128-131
Publication date: 2012

Host publication information
Title of host publication: Water Fountains in the Worldscape
Place of publication: Kangasala
Publisher: International Water History Association and KehräMedia
Editors: Ari, J. H., Petri, S. J., Tapio, S. K.
ISBN (Print): 978-951-98151-8-3

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 4443
Research output: Scientific › Chapter

Testattua tahdistusta

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L.
Pages: 24-26
Publication date: 2012
Peer-reviewed: Unknown

Publication information
Journal: Sähkö & Tele
The experiences of technical university students on an "environmental health" course

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Gonzalez-Sosa, J., Korpinen, L.
Pages: 1586-1592
Publication date: 2012

Host publication information
Title of host publication: EDULEARN12 Proceedings, 4th International Conference on Education and New Learning Technologies, 2-4 July, 2012, Barcelona, Spain
Place of publication: Barcelona
Publisher: International Association of Technology, Education and Development IATED
Editors: Gomez Chova, L., Candel Torres, I., Lopez Martinez, A.
ISBN (Print): 978-84-695-3491-5

Publication series
Name: International Conference on Education and New Learning Technologies

Bibliographical note
EI UT-numeroa 13.8.2013
Contribution: organisation=epr,FACT1=1
Publisher name: International Association of Technology, Education and Development IATED
Source: researchoutputwizard
Source-ID: 4103
Research output: Scientific - peer-review › Conference contribution

The Mermaid of Helsinki, Finland

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: School of Architecture, Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Hynynen, A. J., Juuti, P. S., Katko, T. S.
Number of pages: 5
Pages: 107-111
Publication date: 2012

Host publication information
Title of host publication: Water Fountains in the Worldscape
Place of publication: Kangasala
Publisher: International Water History Association and Kehrämä Media Inc.
Editors: Ari, J. H., Petri, S. J., Tapio, S. K.
ISBN (Print): 978-951-98151-8-3

Bibliographical note
EI UT-numeroa 14.8.2013
Contribution: organisation=ark ays,FACT1=0.5
Contribution: organisation=keb bio,FACT2=0.5
Source: researchoutputwizard
Source-ID: 4281
Research output: Scientific › Chapter
Tulevaisuuden vesiosaajat

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering
Authors: Takala, A., Heinonen, U., Innala, T., Lundgren, K., Mattila, H., Vahala, R., Vuola, S.
Pages: 6-7
Publication date: 2012
Peer-reviewed: No

Publication information
Journal: Vesitalous
Volume: 53
Issue number: 3
ISSN (Print): 0505-3838
Original language: Finnish
Links:
http://www.vesitalous.fi

Bibliographical note
Contribution: organisation=keb bio,FACT1=1<br/>Publisher name: Talotekniikka-Julkaisut Oy yhteistyössä Suomen Vesiyhdistys ry.
Source: researchoutputwizard
Source-ID: 5387
Research output: Scientific › Article

Two Years after Donor Funding Ended: Success Factors for Schools to Keep their Urine-Diverting Dry Toilets (UDDTs) Clean and Well Maintained

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Chemistry and Bioengineering
Authors: Pynnönen, K., Tuhkanen, T., Rieck, C., von Munch, E.
Number of pages: 10
Pages: 1-10
Publication date: 2012

Host publication information
Title of host publication: Dry Toilet Conference 2012, 4th International Dry Toilet Conference, Full Papers, 22-24 August 2012, Tampere, Finland
Place of publication: Helsinki
Publisher: Global Dry Toilet Association of Finland

Publication series
Name: International Dry Toilet Conference
Links:

Bibliographical note
Contribution: organisation=keb bio,FACT1=1<br/>Publisher name: Global Dry Toilet Association of Finland
Source: researchoutputwizard
Source-ID: 5122
Research output: Scientific - peer-review › Conference contribution

Ulkoistaminen apuväline vesihuoltoverkostojen kunnossapitoon?

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Urban water conflicts in recent European history: Changing interactions between technology, environment and society

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Barraque, B., Juuti, P. S., Katko, T. S.
Pages: 15-32
Publication date: 2012

Host publication information
Title of host publication: Urban water conflicts
Publisher: Taylor & Francis and UNESCO Publishing; A Balkema book
Editor: Barraque, B.
ISBN (Print): 978-0-415-49862-3

Publication series
Name: Urban water series, UNESCO IHP
Publisher: Taylor & Francis and UNESCO Publishing; A Balkema book
Volume: 7
ISSN (Print): 1749-0790
Links:
http://www.crcpress.com/product/isbn/9780415498630

Bibliographical note
ei ut-numeroa 9.8.2013<br/>Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 3892
Research output: Scientific - peer-review › Chapter

Vesihuollon historian lyhyt oppimäärä

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Pages: 22-22
Publication date: 2012
Peer-reviewed: Unknown

Publication information
Journal: Econetin asakaslehti AQ
Issue number: 3
ISSN (Print): 1799-7763
Vesihuollossa kuntayhteistyö toimii

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S., Pietilä, P. E.
Publication date: 2012
Peer-reviewed: Unknown

Publication information
Journal: Aamulehti
ISSN (Print): 0355-6913
Original language: Finnish

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Publisher name: Econet Oy
Source-ID: 4444
Research output: Professional › Article

Water Fountains in the Worldscape

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: School of Architecture, Department of Chemistry and Bioengineering, Former organisation of the author
Publication date: 2012

Publication information
Place of publication: Kangasala
Publisher: International Water History Association and Kehrämedia Inc.
ISBN (Print): 978-951-98151-8-3
Original language: English

Bibliographical note
on johdanto (Prologue s. 11-18, Epilogue s. 213-214)<br/>Contribution: organisation=ark<br/>FACT1=0.5<br/>Contribution: organisation=keb bio,FACT2=0.5
Source-ID: 4282
Research output: Scientific - peer-review › Anthology

Water - The Most Important Subject of the World

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O., Takala, A., Vihanta, J.
Number of pages: 15
Pages: 44-58
Publication date: 2012
Peer-reviewed: Yes
White-Collar Workers' Self-Reported Physical Symptoms Associated With Using Computers

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Pääkkönen, R., Gobba, F.
Pages: 137-147
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: International Journal of Occupational Safety and Ergonomics
Volume: 18
Issue number: 2
ISSN (Print): 1080-3548
Ratings:
Scopus rating (2016): SJR 0.259 SNIP 0.673 CiteScore 0.64
Scopus rating (2015): SJR 0.284 SNIP 0.729 CiteScore 0.65
Scopus rating (2014): SJR 0.23 SNIP 0.62 CiteScore 0.56
Scopus rating (2013): SJR 0.232 SNIP 0.853 CiteScore 0.65
Scopus rating (2012): SJR 0.344 SNIP 0.732 CiteScore 0.77
Scopus rating (2011): SJR 0.286 SNIP 0.578 CiteScore 0.39
Scopus rating (2010): SJR 0.221 SNIP 0.341
Scopus rating (2009): SJR 0.272 SNIP 0.673
Scopus rating (2008): SJR 0.369 SNIP 0.488
Scopus rating (2007): SJR 0.431 SNIP 0.618
Scopus rating (2006): SJR 0.205 SNIP 0.427
Scopus rating (2005): SJR 0.216 SNIP 0.257
Scopus rating (2004): SJR 0.224 SNIP 0.45
Scopus rating (2003): SJR 0.19 SNIP 0.344
Scopus rating (2002): SJR 0.205 SNIP 0.403
Scopus rating (2001): SJR 0.141 SNIP 0.333
Scopus rating (2000): SJR 0.136 SNIP 0.264
Scopus rating (1999): SJR 0.197 SNIP 0.372
Original language: English
Links:
http://www.ciop.pl/786.html
Biogenic hydrogen and methane production from reed canary grass

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Lakaniemi, A., Koskinen, P. E., Nevatalo, L. M., Kaksonen, A. H., Puhakka, J. A.
Pages: 773-780
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Biomass & Bioenergy
Volume: 35
Issue number: 2
ISSN (Print): 0961-9534
Ratings:
Scopus rating (2016): CiteScore 3.71 SJR 1.188 SNIP 1.368
Scopus rating (2015): SJR 1.521 SNIP 1.615 CiteScore 4.03
Scopus rating (2014): SJR 1.888 SNIP 1.985 CiteScore 4.36
Scopus rating (2013): SJR 1.678 SNIP 1.823 CiteScore 4.42
Scopus rating (2012): SJR 1.545 SNIP 1.743 CiteScore 3.66
Scopus rating (2011): SJR 1.793 SNIP 2.283 CiteScore 4.74
Scopus rating (2010): SJR 1.931 SNIP 2.254
Scopus rating (2009): SJR 1.743 SNIP 2.187
Scopus rating (2008): SJR 1.609 SNIP 2.073
Scopus rating (2007): SJR 1.454 SNIP 1.77
Scopus rating (2006): SJR 1.292 SNIP 1.954
Scopus rating (2005): SJR 1.226 SNIP 1.398
Scopus rating (2004): SJR 1.037 SNIP 1.637
Scopus rating (2003): SJR 0.693 SNIP 1.312
Scopus rating (2002): SJR 0.442 SNIP 0.764
Scopus rating (2001): SJR 0.468 SNIP 0.994
Scopus rating (2000): SJR 0.429 SNIP 0.903
Scopus rating (1999): SJR 0.431 SNIP 1.105
Original language: English
Calculation of Induced Electric Fields in Human Models Exposed to ELF Magnetic and Electric Fields

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Tarao, H., Hayashi, N., Korpinen, L., Matsumoto, T., Isaka, K.
Pages: 44-44
Publication date: 2011

Host publication information
Title of host publication: ISH 2011, 17th International Symposium on High Voltage Engineering, August 22-26, 2011, Hannover, Germany
Place of publication: Hannover
Publisher: Leibnitz Universität Hannover
Editors: Gockenbach, E., Eichler, C., Mohsen, F., Fischer, M., Gratz, O., Pham, K., Zhang, X.
ISBN (Print): 978-3-8007-3364-4

Publication series
Name: International Symposium on High Voltage Engineering ISH
Publisher: Leibnitz Universität Hannover

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 7360
Research output: Scientific - peer-review » Conference contribution

CFD Based Modelling for Predicting Fouling and Corrosion in Kraft Recovery Boilers

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Authors: Leppänen, A., Välimäki, E., Oksanen, A.
Pages: 1033-1040
Publication date: 2011

Host publication information
Title of host publication: 19th European Biomass Conference and Exhibition, 6-10 June 2011, Berlin Germany
Place of publication: Berlin
Publisher: European Biomass Conference and Exhibition
ISBN (Print): 978-88-89407-55-7

Publication series
Name: European Biomass Conference and Exhibition
Publisher: European Biomass Conference and Exhibition
DOIs: 10.5071/19thEUBCE2011-OA10.3
Links:
http://www.conference-biomass.com

Bibliographical note
ei ut-numeroa 5.4.2014<br/>Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Challenges to Finnish water and wastewater services in the next 20-30 years

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Life Cycle Effectiveness of the Built Environment (LCE@BE)
Authors: Heino, O. A., Takala, A. J., Katko, T. S.
Number of pages: 20
Pages: 1-20
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: E-Water
Article number: 2011/01
ISSN (Print): 1994-8549
Ratings:
Scopus rating (2016): SJR 0.112 SNIP 1.091 CiteScore 0.5
Scopus rating (2015): SJR 0.108 SNIP 0 CiteScore 0
Scopus rating (2014): SJR 0.106 SNIP 0 CiteScore 0
Scopus rating (2013): SJR 0.105 SNIP 0 CiteScore 0
Scopus rating (2012): SJR 0.111 SNIP 0 CiteScore 0
Scopus rating (2011): SJR 0.118 SNIP 0.428
Scopus rating (2010): SJR 0.126 SNIP 0.104
Scopus rating (2009): SJR 0.126 SNIP 0.055
Original language: English

Bibliographical note
Lehden sivuilla mainittu: Prior to publication, proposed articles are reviewed by two referees from a network of European experts who form the Communication Committee of the EWA.Ei UT-numeroa 8.3.2014<br/>Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 6062
Research output: Scientific - peer-review » Article

Comparison between the Occupational ELF magnetic field exposure in Finland and in Italy

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Lahtinen, S., Gobba, F.
Pages: 2 p
Publication date: 2011

Host publication information
Title of host publication: 10th International Conference European Bioelectromagnetics Association, 21-24 February 2011, Rome, Italy
Place of publication: Rome
Publisher: European Bioelectromagnetics Association

Publication series
Name: International Conference European Bioelectromagnetics Association
Publisher: European Bioelectromagnetics Association

Bibliographical note
ei ut-numeroa 22.3.2014<br/>Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 6419
Research output: Scientific - peer-review » Conference contribution
Developing and testing characterization methods for droplet combustion - part II

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Pääkkönen, A., Pitkänen, A., Mäkiranta, R., Saario, A., Oksanen, A.
Number of pages: 10
Pages: 1-10
Publication date: 2011

Host publication information
Title of host publication: 9th European Conference on Industrial Furnaces and Boilers, Estoril, Portugal, 26-29 April, 2011
Place of publication: Estoril
Publisher: INFUB

Publication series
Name: European Conference on Industrial Furnaces and Boilers
Publisher: INFUB

Bibliographical note
ei ut-numeroa 26.4.2014<br/>Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 6938
Research output: Scientific - peer-review › Conference contribution

Editorial. Central role of water in society and community

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Pages: 8-11
Publication date: 2011
Peer-reviewed: No

Publication information
Journal: Ympäristöhistoria: Finnish Journal of Environmental History
Volume: 1
Issue number: 2
ISSN (Print): 1799-6953
Original language: English
Links:

Bibliographical note
Contribution: organisation=keb bio,FACT1=1<br/>Publisher name: International Environmental History Group (IEHG)
Source: researchoutputwizard
Source-ID: 6325
Research output: Scientific › Article

Examples of occupational ELF electric and magnetic field exposure in Finland

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Alanko, T., Pääkkönen, R., Lahtinen, S., Korpinen, L.
Number of pages: 2
Pages: 1-2
Publication date: 2011
Helsinki sai ensimmäisen puhdistamonsa 1910; Helsinki gained its first wastewater treatment plant 1910

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Juuti, P., Katko, T., Rajala, R.
Pages: 49-50
Publication date: 2011
Peer-reviewed: Unknown

Publication information
Journal: Kuntateknikka
Volume: 66
Issue number: 1
ISSN (Print): 1238-125X
Original language: Finnish

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 6247
Research output: Professional › Article

Hyvän veden ja hyvien yhteyksien kaupunki - Riihimäen Veden historia

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Department of Civil Engineering, Former organisation of the author
Authors: Juuti, P., Rajala, R., Pietilä, P., Katko, T.
Pages: 36-40
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Vesitalous
Volume: 52
Issue number: 5
ISSN (Print): 0505-3838
Original language: Finnish
Links:
http://www.vesitalous.fi

Bibliographical note
Identification of Wastewater Leaching into the Wells by HPLC-SEC Using UV and Fluorescence Detection

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Szabo, H. M., Tuhkanen, T.
Pages: 893-897
Publication date: 2011

Host publication information
Title of host publication: Survival and Sustainability: Environmental concerns in the 21st Century
Publisher: Springer Berlin Heidelberg
Editors: Huseyin, G., Umut, T., James, W. L.
ISBN (Print): 978-3-540-95990-8

Publication series
Name: Environmental Earth Sciences
Publisher: Springer Berlin Heidelberg
DOIs:
10.1007/978-3-540-95991-5_84

Bibliographical note
ei ut-numeroa 17.5.2014<br/>Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 7342
Research output: Scientific - peer-review › Chapter

Ja alussa oli vesi

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 15-18
Publication date: 2011

Host publication information
Title of host publication: Vinttikaivosta vesiyhtiöön
Place of publication: Saarijärvi
Publisher: TamPub
Editors: Juuti, P., Rajala, R.
ISBN (Electronic): 978-951-44-8409-4
Links:
http://urn.fi/urn:isbn:978-951-44-8409-4
Research output: Scientific - peer-review › Chapter

Kasvun ja veden kausi – I vesilaitoksesta II maailmansotaan

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 51-74
Publication date: 2011
KUPERA-kaupunkien teknisen sektorin johto kaipaa toimintakulttuurin muutosta : Haasteista innovatiivisiin mahdollisuuksiin

Kuntatekniikka

Issue number: 7
ISSN (Print): 1238-125X
Original language: Finnish

Affiliaatio: Johtamiskorkeakoulu, Tampereen Yliopisto
Contribution: organisation=keb,FACT1=1
Source: researchoutputwizard
Source-ID: 6593
Research output: Professional › Article

Laajentumisen aika

Laajentumisen aika

Lack of water engineers hampering development. North-South cooperation in higher education is a must

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 75-118
Publication date: 2011

Host publication information
Title of host publication: Vinttikaivosta vesiyhtiöön
Place of publication: Saarijärvi
Publisher: TamPub
Editors: Juuti, P., Rajala, R.
ISBN (Electronic): 978-951-44-8409-4
Links:
http://urn.fi/urn:isbn:978-951-44-8409-4
Research output: Scientific - peer-review › Chapter

Lack of water engineers hampering development. North-South cooperation in higher education is a must

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Hukka, J. J., Katko, T. S., Pietilä, P. P.
Pages: 58-61
L’oxydation chimique pour la remediation des sols contamines par des composes recalcitrants. Cas de la chlordecone

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Chemistry and Bioengineering
Authors: Tuhkanen, T.
Pages: 8-11
Publication date: 2011

Host publication information
Title of host publication: Remediation a la pollution par la chlordecone aux Antilles, No 9-10, Avril 2011
Publisher: Le Lamentin

Publication series
Name: Les Cahiers du PRAM
ISSN (Print): 1638-3974

Bibliographical note
Chapter in a book + oral presentation<br/>Contribution: organisation=keb bio,FACT1=1<br/>Publisher name: Le Lamentin
Source: researchoutputwizard
Source-ID: 7404
Research output: Professional › Conference contribution

Luminescent bacteria-based sensing method for methylmercury specific determination

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Rantala, A., Utriainen, M., Kaushik, N., Virta, M., Välimaa, A., Karp, M.
Pages: 1041-1049
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Analytical and Bioanalytical Chemistry
Volume: 400
Issue number: 4
ISSN (Print): 1618-2642
Ratings:
Scopus rating (2016): CiteScore 3.03 SJR 0.943 SNIP 1.039
Scopus rating (2015): SJR 1.064 SNIP 1.083 CiteScore 3.07
Scopus rating (2014): SJR 1.126 SNIP 1.222 CiteScore 3.26
Scopus rating (2013): SJR 1.229 SNIP 1.282 CiteScore 3.55
Scopus rating (2012): SJR 1.347 SNIP 1.282 CiteScore 3.51
Scopus rating (2011): SJR 1.363 SNIP 1.275 CiteScore 3.47
Scopus rating (2010): SJR 1.354 SNIP 1.236
Scopus rating (2009): SJR 1.272 SNIP 1.237
Scopus rating (2008): SJR 1.144 SNIP 1.076
Scopus rating (2007): SJR 1.08 SNIP 1.096
Scopus rating (2006): SJR 0.981 SNIP 1.051
Scopus rating (2005): SJR 0.963 SNIP 1.134
Scopus rating (2004): SJR 0.88 SNIP 0.968
Scopus rating (2003): SJR 0.782 SNIP 1.155
Scopus rating (2002): SJR 0.699 SNIP 0.818
Scopus rating (1999): SJR 0.715 SNIP 1.007
Original language: English
DOIs: 10.1007/s00216-011-4866-x

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 7088
Research output: Scientific - peer-review » Article

Lyhyestä tiede kaunis?

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Pages: 55-55
Publication date: 2011
Peer-reviewed: No

Publication Information
Journal: Tiedepolitiikka
Volume: 36
Issue number: 2
ISSN (Print): 0782-0674
Original language: Finnish

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 6326
Research output: Scientific » Article

Managing water supply through joint regional municipal authorities in Finland: Two comparative cases

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Stenroos, M., Katko, T. S.
Pages: 667-681
Publication date: 2011
Peer-reviewed: Yes

Publication Information
Journal: Water
Volume: 3
Issue number: 2
ISSN (Print): 2073-4441
Ratings:
Scopus rating (2016): CiteScore 2.05 SJR 0.548 SNIP 1.079
Modeling of Fine Particles and Alkali Metal Compounds in Kraft Recovery Boiler Furnace

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Authors: Leppänen, A., Välimäki, E., Oksanen, A.
Number of pages: 8
Pages: 1-8
Publication date: 2011

Host publication information
Title of host publication: The 2011 TAPPI PEERS Conference, 2-5 October 2011, Oregon Convention Center in Portland, Oregon USA
Place of publication: Norcross, GA
Publisher: TAPPI

Publication series
Name: TAPPI PEERS Conference
Publisher: TAPPI
Links:
http://www.tappipeers.org

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 7305
Research output: Scientific - peer-review » Article

Occupational Exposure to Electric and Magnetic Fields While Working at Switching and Transforming Stations of 110 kV

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Kuisti, H., Pääkkönen, R., Vanhala, P., Elovaara, J.
Pages: 526-536
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Annals of Occupational Hygiene
Volume: 55
Issue number: 5
ISSN (Print): 0003-4878
Ratings:
Scopus rating (2016): SJR 0.789 SNIP 1.048 CiteScore 1.44
Scopus rating (2015): SJR 0.873 SNIP 1.445 CiteScore 1.92
Occupational exposure to electric fields and induced currents associated with 400 kV substation tasks from different service platforms

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Elovaara, J. A., Kuisti, H. A.
Pages: 79-83
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Bioelectromagnetics
ISSN (Print): 0197-8462
Ratings:
Scopus rating (2016): CiteScore 1.99 SJR 0.572 SNIP 1.1
Scopus rating (2015): SJR 0.599 SNIP 1.079 CiteScore 1.86
Scopus rating (2014): SJR 0.624 SNIP 1.259 CiteScore 1.79
Scopus rating (2013): SJR 0.68 SNIP 1.341 CiteScore 2.13
Scopus rating (2012): SJR 0.623 SNIP 1.15 CiteScore 1.98
Scopus rating (2011): SJR 0.515 SNIP 1.225 CiteScore 2.27
Scopus rating (2010): SJR 0.817 SNIP 1.206
Scopus rating (2009): SJR 0.717 SNIP 1.334
Scopus rating (2008): SJR 0.691 SNIP 0.992
Scopus rating (2007): SJR 0.754 SNIP 1.363
Scopus rating (2006): SJR 0.553 SNIP 1.341
Scopus rating (2005): SJR 0.619 SNIP 1.4
Scopus rating (2004): SJR 0.649 SNIP 1.242
Scopus rating (2003): SJR 0.598 SNIP 0.916
Scopus rating (2002): SJR 0.576 SNIP 1.101
Physical symptoms in young adults and their use of different computers and mobile phones

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Pääkkönen, R.
Pages: 361-371
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: International Journal of Occupational Safety and Ergonomics
Volume: 17
Issue number: 4
ISSN (Print): 1080-3548
Ratings:
Scopus rating (2016): SJR 0.259 SNIP 0.673 CiteScore 0.64
Scopus rating (2015): SJR 0.284 SNIP 0.729 CiteScore 0.65
Scopus rating (2014): SJR 0.23 SNIP 0.62 CiteScore 0.56
Scopus rating (2013): SJR 0.232 SNIP 0.853 CiteScore 0.65
Scopus rating (2012): SJR 0.344 SNIP 0.732 CiteScore 0.77
Scopus rating (2011): SJR 0.286 SNIP 0.578 CiteScore 0.39
Scopus rating (2010): SJR 0.221 SNIP 0.341
Scopus rating (2009): SJR 0.272 SNIP 0.673
Scopus rating (2008): SJR 0.369 SNIP 0.488
Scopus rating (2007): SJR 0.431 SNIP 0.618
Scopus rating (2006): SJR 0.205 SNIP 0.427
Scopus rating (2005): SJR 0.216 SNIP 0.257
Scopus rating (2004): SJR 0.224 SNIP 0.45
Scopus rating (2003): SJR 0.19 SNIP 0.344
Scopus rating (2002): SJR 0.205 SNIP 0.403
Scopus rating (2001): SJR 0.141 SNIP 0.333
Scopus rating (2000): SJR 0.136 SNIP 0.264
Scopus rating (1999): SJR 0.197 SNIP 0.372
Original language: English

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 6421
Research output: Scientific - peer-review › Article
Pääkirjoitus. Veden keskeinen merkitys yhteiskunnassa ja yhdyskunnissa

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Pages: 4-7
Publication date: 2011
Peer-reviewed: No

Publication information
Journal: Ympäristöhistoria: Finnish Journal of Environmental History
Volume: 1
Issue number: 2
ISSN (Print): 1799-6953
Original language: Finnish
Links:
http://www.uta.fi/yky/tutkimus/historia/projektit/iehg/Ymparistohistoria/No0211/Yfjeh022011.pdf

Bibliographical note
Contribution: organisation=keb bio, FACT1=1
Publisher name: International Environmental History Group (IEHG)
Source: researchoutputwizard
Source-ID: 6327
Research output: Scientific › Article

Reduction of combustion-generated emissions by means of multiobjective optimization and computational fluid dynamics

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Oksanen, A., Saario, A. J.
Number of pages: 17
Pages: 1-17
Publication date: 2011

Host publication information
Title of host publication: CFD & Optimization 2011, Methods and Applications, ECCOMAS Thematic Conference, 23-25 May 2011, Antalya, Turkey
Place of publication: Antalya
Publisher: ECCOMAS
ISBN (Print): 978-605-61427-4-1

Publication series
Name: ECCOMAS Thematic Conference on CFD & Optimization, Methods and Applications
Publisher: ECCOMAS

Bibliographical note
Contribution: organisation=epr, FACT1=1
Source: researchoutputwizard
Source-ID: 6920
Research output: Scientific - peer-review › Conference contribution

Significance of Wild Cards and Weak Signals for Sustainability: Case of Water Services

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O. A., Takala, A. J.
Pages: 410-422
Publication date: 2011

Host publication information
Study of Aerosols of Black Liquor Combustion

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Authors: Leppänen, A., Välimäki, E., Oksanen, A.
Number of pages: 11
Pages: 1-11
Publication date: 2011

Host publication information
Title of host publication: 11th International Conference on Energy for Clean Environment, 5-8 July 2011, Lisbon Portugal
Place of publication: Lisbon
Publisher: Clean Air conference series

Publication series
Name: International Conference on Energy for Clean Environment
Publisher: Clean Air conference series

Bibliographical note
ei ut-numeroa 5.4.2014<br/>Contribution: organisation=epr,FACT1=1<br/>Source: researchoutputwizard
Source-ID: 6600
Research output: Scientific - peer-review › Conference contribution

Sustainability competencies of engineers in the field of water supply and sanitation

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Chemistry and Bioengineering
Authors: Takala, A.
Pages: 180-181
Publication date: 2011

Host publication information
Title of host publication: World Sustainable Building Conference SB11, October 18-21, 2011, Helsinki, Finland
Place of publication: Helsinki
Publisher: RIL - Finnish Association of Civil Engineers
ISBN (Print): 978-951-758-534-7

Publication series
The doors of operating devices mitigation influence to the electric field exposure at 110kV substation tasks on service platforms

General information
The evolving role of water co-operatives in Finland

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Takala, A. J., Arvonen, V., Katko, T. S., Pietilä, P. E., Åkerman, M. W.
Pages: 11-19
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: International Journal of Co-Operative Management
Volume: 5
Issue number: 2
ISSN (Print): 1741-4814
Original language: English

Bibliographical note
ei ut-numeroa 17.5.2014<br/>Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 7349
Research output: Scientific - peer-review › Article

The factors controlling combustion and gasification kinetics of solid fuels

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Energy and Process Engineering
Authors: Tolvanen, H., Kokko, L., Raiko, R.
Number of pages: 14
Pages: 1-14
Publication date: 2011

Host publication information
Place of publication: Piteå
Publisher: IFRF and the Scandinavian-Nordic Section of the Combustion Institute

Publication series
The Fountain A Harbinger of a New Era in Case Tampere

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: School of Architecture, Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Hynynen, A., Juuti, P., Katko, T.
Pages: 63-70
Publication date: 2011

Host publication information
Title of host publication: Water Fountains in the Cityscape. Essays in Public Works History
Place of publication: Kansas City, MO
Publisher: Public Works Historical Society
Editors: Hynynen, A. J., Juuti, P. S., Katko, T. S.

Publication series
Name: Essays in Public Works History
Publisher: Public Works Historical Society
Volume: 30
ISSN (Print): 1047-5257

Bibliographical note
ei ut-numeroa 15.3.2014<br/>Contribution: organisation=ark ays,FACT1=0.33<br/>Contribution: organisation=keb bio,FACT2=0.67
Source: researchoutputwizard
Source-ID: 6156
Research output: Scientific › Chapter

The technical students’ feedback from the course issues on environmental health

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Lehtelä, R., Vesapuisto, M., Vekara, T.
Pages: 119-123
Publication date: 2011

Host publication information
Title of host publication: Proceedings of the 22nd EAEEIE Annual Conference - EAEEIE 2011, Maribor, Slovenia, June 13-15, 2011
Place of publication: Maribor
Publisher: University of Maribor, Faculty of Electrical Engineering and Computer Science

Publication series
Name: EAEEIE Annual Conference
Publisher: University of Maribor, Faculty of Electrical Engineering and Computer Science

Bibliographical note
ei ut-numeroa 22.3.2014<br/>Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 6420
Research output: Scientific - peer-review › Conference contribution
Työntekijöiden altistuminen sähkö- ja magneettikentille 110 kV sähköasemien työtehtävissä

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L.
Number of pages: 62
Publication date: 2011

Publication information
Publisher: Tampereen teknillinen yliopisto
Original language: Finnish

Publication series
Name: Tampereen teknillinen yliopisto. Energia- ja prosessitekniikan laitos. Raportti
Publisher: Tampereen teknillinen yliopisto
Volume: 192
ISSN (Print): 1459-3440

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 6415
Research output: Professional › Commissioned report

Uuden vuosituhannen tiennäyttäjä – HS-Veden alkutaival

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 177-222
Publication date: 2011

Host publication information
Title of host publication: Vinttikaivosta vesiyhtiöön
Place of publication: Saarijärvi
Publisher: TamPub
Editors: Juuti, P., Rajala, R.
ISBN (Electronic): 978-951-44-8409-4
Links:
http://urn.fi/urn:isbn:978-951-44-8409-4
Research output: Scientific - peer-review › Chapter

Values and Attitudes in Engineering Education

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Korhonen-Yrjänheikki, K., Takala, A., Mielttyinen, I.
Pages: 65-83
Publication date: 2011

Host publication information
Title of host publication: It’s just People with People - Views of Corporate Social Responsibility. Aalto University
Publication Series Crossover
Editor: Lappalainen, P.
ISBN (Print): 978-952-60-0036-7
Vesihuollon alkutaival – kehitys 1910 asti

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 19-50
Publication date: 2011

**Host publication information**
Title of host publication: Vinttiakivosta vesiyhtiöön
Place of publication: Saarijärvi
Publisher: TamPub
Editors: Juuti, P., Rajala, R.
ISBN (Electronic): 978-951-44-8409-4
Links:
http://urn.fi/urn:isbn:978-951-44-8409-4
Research output: Scientific - peer-review › Chapter

Vesihuoltoto kuntilin

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 119-176
Publication date: 2011

**Host publication information**
Title of host publication: Vinttiakivosta vesiyhtiöön
Place of publication: Saarijärvi
Publisher: TamPub
Editors: Juuti, P., Rajala, R.
ISBN (Electronic): 978-951-44-8409-4
Links:
http://urn.fi/urn:isbn:978-951-44-8409-4
Research output: Scientific - peer-review › Chapter

Vesi on parasta kylmänä – loppusanat

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 223-231
Publication date: 2011

**Host publication information**
Title of host publication: Vinttiakivosta vesiyhtiöön
Place of publication: Saarijärvi
Publisher: TamPub
Water education makes a global difference

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Number of pages: 3
Pages: 1-3
Publication date: 2011
Peer-reviewed: Unknown

Publication information
Journal: Interface: Science Magazine
Issue number: 1/2011
Original language: English
Links:
http://interface.tut.fi/
http://interface.tut.fi/articles/2011/1/Water education makes a global difference

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 6328
Research output: General public › Article

Water Fountains in the Cityscape

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: School of Architecture, Department of Chemistry and Bioengineering, Former organisation of the author
Publication date: 2011

Publication information
Place of publication: Kansas City, MO
Publisher: Public Works Historical Society
Original language: English

Publication series
Name: Essays in Public Works History
Publisher: Public Works Historical Society
Volume: 30
ISSN (Print): 1047-5257

Bibliographical note
Contrib.: organisation=ark ays,FACT1=0.33<br/>Contrib.: organisation=keb bio,FACT2=0.67
Source: researchoutputwizard
Source-ID: 6155
Research output: Scientific - peer-review › Anthology

Working-aged population's mental symptoms and the use of the Internet

General information
A comparison of the usability of a laptop, communicator, and handheld computer

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Suomalainen, P., Korpinen, L., Pääkkönen, R.
Number of pages: 13
Pages: 111-123
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Journal of Usability Studies
Volume: 5
Issue number: 3
ISSN (Print): 1931-3357
Original language: English
Links:
http://www.upassoc.org/upa_publications/jus/2010may/suomalainen-authors.html

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 9341
Research output: Scientific - peer-review › Article

Adjustable hydrophilicity and hydrophobicity on paperboard by liquid flame spray process

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
An example of exposure to magnetic fields in the home

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Österholm, L., Pääkkönen, R., Lehtelä, R., Holm, A., Korpinen, L.
Number of pages: 2
Pages: 1-2
Publication date: 2010

Host publication information
Title of host publication: Bioelectromagnetics Society 32nd Annual Meeting (BEMS), June 14-18, 2010, Seoul, Korea
Links:
http://www.bioelectromagnetics.org/bems2010/

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 8914
Research output: Scientific - peer-review › Conference contribution

Asiakkaat, verkostot ja henkilöstö

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering
Authors: Rajala, R.
Pages: 370-491
Publication date: 2010

Host publication information
Title of host publication: Näkymätönt Porrii: Porin Veden historia
Publisher: TamPub
Editors: Juuti, P., Katko, T., Louekari, S., Rajala, R.
ISBN (Print): 978-952-5414-80-6
ISBN (Electronic): 978-951-44-8215-1
Links:
http://urn.fi/urn:isbn:978-951-44-8215-1
Research output: Scientific - peer-review › Chapter

Asteittain kohti keskitettyä jätevedenpuhdistusta

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Atmospheric plasma enhanced hybrid barrier films through reel-to-reel process

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Nikkola, J., Mannila, J., Vartiainen, J., Tuominen, M., Nättinen, K.
Number of pages: 11
Pages: 1-11
Publication date: 2010

Host publication information
Title of host publication: ICNP-2010, Second International Conference on Natural Polymers, Bio-Polymers, Bio-Materials, their Composites, Blends, IPNs and Gels Polyelectrolytes and Gels: Macro to Nano Scales, September 24-26, 2010, Espoo, Finland

Bibliographical note
Contribution: organisation=epr pap,FACT1=1
Source: researchoutputwizard
Source-ID: 8851
Research output: Scientific - peer-review › Conference contribution

Bilateral collaboration in municipal water and wastewater services in Finland

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Chemistry and Bioengineering
Authors: Kurki, V. O., Katko, T. S., Pietilä, P. E.
Pages: 815-825
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Water
Volume: 2
Issue number: 4
ISSN (Print): 2073-4441
Ratings:
Scopus rating (2016): CiteScore 2.05 SJR 0.548 SNIP 1.079
Scopus rating (2015): SJR 0.522 SNIP 1.043 CiteScore 1.96
Scopus rating (2014): SJR 0.466 SNIP 0.862 CiteScore 1.45
Scopus rating (2013): SJR 0.283 SNIP 0.553 CiteScore 1
Scopus rating (2012): SJR 0.239 SNIP 0.562
Original language: English
DOI:s:
10.3390/w2040815

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Book Review: Graham, S. (Ed.), Disrupted Cities: When Infrastructure Fails

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Publication date: 2010
Peer-reviewed: No

Publication information
Original language: English

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8309
Research output: Scientific › Article

Co-operation between technical education of university and electro-technical standardization association

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Hieta-Wilkman, S., Vesa, J., Korpinen, L.
Pages: 165-168
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Elektronika ir Elektrotechnika
Volume: 10
Issue number: 106
ISSN (Print): 1392-1215
Ratings:
Scopus rating (2016): SJR 0.321 SNIP 0.668 CiteScore 0.85
Scopus rating (2015): SJR 0.347 SNIP 0.599 CiteScore 0.71
Scopus rating (2014): SJR 0.292 SNIP 0.653 CiteScore 0.66
Scopus rating (2013): SJR 0.252 SNIP 0.634 CiteScore 0.53
Scopus rating (2012): SJR 0.226 SNIP 0.71 CiteScore 0.49
Scopus rating (2011): SJR 0.203 SNIP 1.038 CiteScore 0.84
Scopus rating (2010): SJR 0.213 SNIP 0.3
Scopus rating (2009): SJR 0.19 SNIP 0.018
Original language: English

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 8075
Research output: Scientific › Article

Developing and testing characterization methods for droplet combustion - Part I

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Development of superhydrophobic coating on paperboard surface using the Liquid Flame Spray

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering, Department of Physics
Authors: Teisala, H., Tuominen, M., Aromaa, M., Mäkelä, J. M., Stepień, M., Saarinen, J., Toivakka, M., Kuusipalo, J.
Pages: 436-445
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Surface and Coatings Technology
Volume: 205
Issue number: 2
ISSN (Print): 0257-8972
Ratings:
Scopus rating (2016): CiteScore 2.56 SJR 0.874 SNIP 1.359
Scopus rating (2015): SJR 0.871 SNIP 1.415 CiteScore 2.46
Scopus rating (2014): SJR 0.998 SNIP 1.681 CiteScore 2.44
Scopus rating (2013): SJR 1.057 SNIP 1.859 CiteScore 2.58
Scopus rating (2012): SJR 1.049 SNIP 1.658 CiteScore 2.2
Scopus rating (2011): SJR 1.053 SNIP 1.851 CiteScore 2.38
Scopus rating (2010): SJR 1.155 SNIP 1.66
Scopus rating (2009): SJR 1.449 SNIP 1.526
Scopus rating (2008): SJR 1.479 SNIP 1.564
Scopus rating (2007): SJR 1.165 SNIP 1.509
Scopus rating (2006): SJR 1.276 SNIP 1.709
Scopus rating (2005): SJR 1.252 SNIP 1.666
Scopus rating (2004): SJR 1.269 SNIP 1.498
Scopus rating (2003): SJR 1.276 SNIP 1.516
Scopus rating (2002): SJR 1.208 SNIP 1.183
Scopus rating (2001): SJR 1.115 SNIP 1.181
Scopus rating (2000): SJR 0.981 SNIP 1.03
Scopus rating (1999): SJR 1.062 SNIP 1.167
Original language: English
DOIs:
10.1016/j.surfcoat.2010.07.003
Links:
http://www.elsevier.com/locate/surfcoat
Experimental study of oxy-fuel combustion in a drop tube reactor

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Energy and Process Engineering
Authors: Rodriguez, A. M., Raiko, R.
Number of pages: 11
Pages: 1-11
Publication date: 2010
Exposure to electric and magnetic fields at 110 kV substation while performing the task 'Changing a bulb from a man hoist' in the Tampere region

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Pääkkönen, R., Holm, A., Korpinnen, L.
Number of pages: 2
Pages: 1-2
Publication date: 2010

Fate of dissolved organic matter in softwood element-chlorine-free bleached kraft mill fiberline

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Chemistry and Bioengineering
Authors: Luonsi, A.
Publication date: 2010

Finnish engineering education for the benefit of people and environment

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Forgotten infrastructure - In the quest for development, sustainability and security

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Chemistry and Bioengineering
Authors: Hukka, J., Katko, T. S., Pietilä, P. E., Seppälä, O., Vinnari, E. M.
Pages: 318-325
Publication date: 2010

Host publication information
Title of host publication: Proceedings of the Conference on Security in Futures - Security in Change, 3-4 June 2010, Turku, Finland. FFRC eBook
Editors: Auffermann, B., Kaskinen, J.

Bibliographical note
poistettu tupla r=3725<br/>Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8108
Research output: Scientific - peer-review › Conference contribution

Geometry of plate fins for maximizing heat transfer

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanics and Design, Department of Energy and Process Engineering
Authors: Karvinen, R., Karvinen, T.
Number of pages: 10
Pages: 1-10
Publication date: 2010

Host publication information
Title of host publication: 14th International Heat Transfer Conference IHTC-14, August 8-13, 2010, Washington DC, USA
Publisher: ASME

Bibliographical note
50 % Mec, 50 % Epr, poistettu tupla r=3301<br/>Contribution: organisation=epr,FACT1=0.5<br/>Contribution: organisation=mec,FACT2=0.5
Source: researchoutputwizard
Source-ID: 8302
Research output: Scientific - peer-review › Conference contribution

Hydrodynamic drag and velocity of micro-bubbles in dilute paper machine suspensions

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Hyvän veden ja hyvien yhteyksien kaupunki: Riihimäen Veden historia

General information
State: Published
Ministry of Education publication type: C1 Separate scientific books
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Juuti, P., Rajala, R. P., Pietilä, P. E., Katko, T. S.
Number of pages: 336
Publication date: 2010

Publication information
Publisher: Riihimäen Vesi
ISBN (Print): 978-952-5571-29-5
Original language: Finnish
Electronic versions: juuti_hyvan_veden_ja_hyvien_yhteyksien_kaupunki.pdf

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8244
Research output: Scientific - peer-review › Book

Ikääntyvä infra - vesihuollon keskeisin haaste

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O., Katko, T., Takala, A.
Pages: 22-24
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Vesitalous
Issue number: 6
ISSN (Print): 0505-3838
Original language: Finnish

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8050
Research output: Scientific - peer-review › Review Article

Influence of atmospheric plasma treatment on surface properties and inkjet printability of plastic packaging film

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Lahti, J., Eiroma, K., Tenhunen, T., Pykönen, M., Toivakka, M.
Number of pages: 7
Pages: 1-7
Publication date: 2010

Host publication information
Title of host publication: Iarigai 2010 Montreal, Advances in Printing and Media Technology, Montreal, Canada, September 12-15, 2010
Integration of water and wastewater utilities

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Katko, T. S., Kurki, V. O., Juuti, P. S., Rajala, R. P., Seppälä, O. T.
Pages: 62-70
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Journal American Water Works Association
Volume: 102
Issue number: 9
ISSN (Print): 0003-150X
Ratings:
Scopus rating (2016): SJR 0.298 SNIP 0.646 CiteScore 0.37
Scopus rating (2015): SJR 0.362 SNIP 0.6 CiteScore 0.41
Scopus rating (2014): SJR 0.383 SNIP 0.753 CiteScore 0.3
Scopus rating (2013): SJR 0.472 SNIP 0.859 CiteScore 0.36
Scopus rating (2012): SJR 0.472 SNIP 0.964 CiteScore 0.37
Scopus rating (2011): SJR 0.456 SNIP 0.839 CiteScore 0.3
Scopus rating (2010): SJR 0.427 SNIP 0.759
Scopus rating (2009): SJR 0.529 SNIP 0.98
Scopus rating (2008): SJR 0.446 SNIP 1.045
Scopus rating (2007): SJR 0.589 SNIP 1.078
Scopus rating (2006): SJR 0.484 SNIP 1.197
Scopus rating (2005): SJR 0.951 SNIP 1.352
Scopus rating (2004): SJR 0.855 SNIP 1.116
Scopus rating (2003): SJR 0.917 SNIP 1.31
Scopus rating (2002): SJR 0.99 SNIP 1.643
Scopus rating (2001): SJR 1.057 SNIP 1.497
Scopus rating (2000): SJR 1.391 SNIP 1.809
Scopus rating (1999): SJR 1.847 SNIP 1.671
Original language: English

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8314
Research output: Scientific - peer-review › Article

Johdanto: vesirikas Riihimäki

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Research group: Industrial Bioengineering and Applied Organic Chemistry, Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Pietilä, P., Rajala, R.
Pages: 26-33
Publication date: 2010

Host publication information
Kirjastolta uutta tiedonhankinnan opetusta tukemaan opetusta antavien yksiköiden toimintaa

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Library, Department of Energy and Process Engineering
Authors: Lepistö, K., Korpinen, L.
Pages: 136-138
Publication date: 2010

Host publication information
Title of host publication: ReflekTori 2010 Teknikan opetuksen symposium 9.-10.2010, Espoo. Dipoli-raportit B
Editor: Myller, E.

Bibliographical note
Contribution: organisation=epr,FACT1=1<br/>
Contribution: organisation=kir,FACT2=0
Source: researchoutputwizard
Source-ID: 8616
Research output: Scientific - peer-review › Conference contribution

Kohti puhtaampaa Itämerta

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 135-142
Publication date: 2010

Host publication information
Title of host publication: Metropoli ja meri - 100 vuotta jättevedenpuhdistusta Helsingissä
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
Links:
http://urn.fi/urn:isbn:978-952-6604-09-1
Research output: Scientific - peer-review › Chapter

Long-term measurement of free time exposure to low frequency magnetic fields in Finland

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Holm, A., Korpinen, L.
Number of pages: 2
Pages: 1-2
Publication date: 2010

Host publication information
Title of host publication: Bioelectromagnetics Society 32nd Annual Meeting (BEMS), June 14-18, 2010, Seoul, Korea
Links:
http://www.bioelectromagnetics.org/bems2010/

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 8089
Research output: Scientific - peer-review › Conference contribution
Metropoli ja meri. 100 vuotta jätevedenpuhdistusta Helsingissä

General information
State: Published
Ministry of Education publication type: C1 Separate scientific books
Organisations: Department of Chemistry and Bioengineering, Department of Civil Engineering,Former organisation of the author
Authors: Juuti, P., Rajala, R., Katko, T.
Number of pages: 158
Publication date: 2010

Publication information
Place of publication: Helsinki
Publisher: HSY Helsingin seudun ympäristöpalvelut
ISBN (Print): 978-952-6604-09-1
Original language: Finnish

Publication series
Name: HSY:n julkaisuja
Publisher: HSY Helsingin seudun ympäristöpalvelut
Volume: 6/2010
Electronic versions:
juuti_metropoli_ja_meri.pdf
Links:
http://urn.fi/URN:NBN:fi:ttty-2011041513515

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8243
Research output: Scientific - peer-review › Book

Mihin jätevedenpuhdistusta tarvitaan?

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 13-35
Publication date: 2010

Host publication information
Title of host publication: Metropoli ja meri - 100 vuotta jätevedenpuhdistusta Helsingissä
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
Links:
http://urn.fi/urn:isbn:978-952-6604-09-1
Research output: Scientific - peer-review › Chapter

Mine wastewater treatment using Phalaris arundinacea plant material hydrolyzate as substrate for sulfate-reducing bioreactor

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Lakaniemi, A., Nevatalo, L. M., Kaksonen, A. H., Puhakka, J. A.
Pages: 3931-3939
Publication date: 2010
Peer-reviewed: Yes

Publication information
Perfusion characterization using flow simulations and μPIV measurements

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering, Department of Energy and Process Engineering
Authors: Kreutzer, J., Honkanen, M., Laaksonen, J., Kallio, P.
Number of pages: 9
Pages: 1-9
Publication date: 2010

Host publication information
Title of host publication: Proceedings of the 2nd European Conference on Microfluidics - Microfluidics 2010, Toulouse, December 8-10, 2010
ISBN (Print): 978-2-906831-85-8

Bibliographical note
Contribution: organisation=ap,FACT1=1
Source: researchoutputwizard
Source-ID: 8550
Research output: General public › Article

Pintavedestä pohjaveteen ja tekopohjaveteen

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Pages: 236-311
Publication date: 2010

Host publication information
Title of host publication: Näkymätönt Porrii. Porin Veden historia
Editors: Juuti, P., Katko, T., Louekari, S., Rajala, R.

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8311
Research output: Scientific - peer-review › Chapter

Pohjavesi, meidän vesi

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering
Authors: Rajala, R.
Pages: 110-147
Publication date: 2010

Host publication information
Title of host publication: Hyvän veden ja hyvien yhteyksien kaupunki : Riihimäen Veden historia
"Poika, nyt lähdettiin hommiin" - vesilaitos syntyy

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: University of Tampere
Authors: Juuti, P.
Pages: 64-109
Publication date: 2010

Host publication information
Title of host publication: Hyvän veden ja hyvien yhteyksien kaupunki : Riihimäen Veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Pietilä, P., Katko, T.
ISBN (Print): 978-952-5571-29-5
Links:
http://urn.fi/urn:isbn:978-951-44-8136-9
Research output: Scientific - peer-review › Chapter

Pääkaupunkiseudun moderni jätevedenpuhdistus ja Viikinmäen puhdistamo

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 91-113
Publication date: 2010

Host publication information
Title of host publication: Metropoli ja meri - 100 vuotta jätevedenpuhdistusta Helsingissä
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
Links:
http://urn.fi/urn:isbn:978-952-6604-09-1
Research output: Scientific - peer-review › Chapter

Requirements for rainfall retention and storage in cold climate

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Chemistry and Bioengineering
Authors: Inha, L., Paavilainen, P., Pietilä, P., Katko, T.
Pages: 343-349
Publication date: 2010

Host publication information
Title of host publication: Conference Proceedings. IWRM Integrated Water Resources Management, 24-25 November 2010, Karlsruhe
Editor: Steusloff, H.

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Rural energy survey and scenario analysis of village energy consumption: A case study in Lao People's Democratic Republic

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Mustonen, S. M.
Pages: 1040-1048
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Energy Policy
Volume: 38
Issue number: 2
ISSN (Print): 0301-4215

Ratings:
Scopus rating (2016): SJR 2.197 SNIP 1.959 CiteScore 4.49
Scopus rating (2015): SJR 2.325 SNIP 1.768 CiteScore 3.98
Scopus rating (2014): SJR 2.193 SNIP 1.93 CiteScore 3.62
Scopus rating (2013): SJR 1.949 SNIP 2.192 CiteScore 3.74
Scopus rating (2012): SJR 1.789 SNIP 2.057 CiteScore 3.52
Scopus rating (2011): SJR 1.603 SNIP 1.917 CiteScore 3.35
Scopus rating (2010): SJR 1.486 SNIP 1.852
Scopus rating (2009): SJR 1.403 SNIP 1.9
Scopus rating (2008): SJR 1.208 SNIP 1.583
Scopus rating (2007): SJR 1.304 SNIP 2.105
Scopus rating (2006): SJR 0.824 SNIP 2.172
Scopus rating (2005): SJR 0.64 SNIP 1.686
Scopus rating (2004): SJR 0.909 SNIP 1.789
Scopus rating (2003): SJR 0.752 SNIP 1.712
Scopus rating (2002): SJR 0.606 SNIP 1.597
Scopus rating (2001): SJR 0.539 SNIP 1.649
Scopus rating (2000): SJR 0.536 SNIP 1.113
Scopus rating (1999): SJR 0.525 SNIP 0.951
Original language: English
DOIs:
10.1016/j.enpol.2009.10.056
Links:
http://www.elsevier.com/locate/enpol

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 8824
Research output: Scientific - peer-review › Article

Rural household electricity load profiles with a load simulation tool

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Energy and Process Engineering
Authors: Poudyal, A., Mustonen, S., Paatero, J.
Pages: 1358-1366
Publication date: 2010
Sanitation, water and health

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Rautanen, S., Luonsi, A., Nygård, H., Vuorinen, H., Rajala, R.
Pages: 173-194
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Environment and History
Volume: 16
Issue number: 2
ISSN (Print): 0967-3407
Ratings:
Scopus rating (2016): SJR 0.596 SNIP 0.883 CiteScore 0.56
Scopus rating (2015): SJR 0.604 SNIP 1.223 CiteScore 0.78
Scopus rating (2014): SJR 0.408 SNIP 1.238 CiteScore 0.78
Scopus rating (2013): SJR 0.261 SNIP 0.746 CiteScore 0.39
Scopus rating (2012): SJR 0.162 SNIP 0.583 CiteScore 0.36
Scopus rating (2011): SJR 0.168 SNIP 0.233 CiteScore 0.3
Scopus rating (2010): SJR 0.136 SNIP 0.62
Scopus rating (2009): SJR 0.44 SNIP 0.973
Scopus rating (2008): SJR 0.364 SNIP 0.582
Scopus rating (2007): SJR 0.25 SNIP 0.932
Scopus rating (2006): SJR 0.432 SNIP 0.861
Scopus rating (2005): SJR 0.261 SNIP 0.302
Scopus rating (2004): SJR 0.318 SNIP 0.805
Scopus rating (2003): SJR 0.35 SNIP 0.773
Scopus rating (2002): SJR 0.235 SNIP 0.642
Scopus rating (2001): SJR 0.115 SNIP 0.236
Scopus rating (2000): SJR 0.165
Scopus rating (1999): SJR 0.166
Original language: English
DOIs:
10.3197/096734010X12699419057250

Bibliographical note
Contribution: organisation=keb.bio,FACT1=1
Source: researchoutputwizard
Source-ID: 9094
Research output: Scientific › peer-review › Article

Self-reported use of ICT (information and communication technology) uptake in 2002 and discomfort amongst Finns aged 45-66
The application of HPLC-SEC for the simultaneous characterization of NOM and nitrate in well waters

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Szabo, H., Tuhkanen, T.
Pages: 779-786
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Chemosphere
Volume: 80
Issue number: 7
ISSN (Print): 0045-6535
Ratings:
Scopus rating (2016): SJR 1.417 SNIP 1.606 CiteScore 4.39
Scopus rating (2015): SJR 1.51 SNIP 1.57 CiteScore 4.04
Scopus rating (2014): SJR 1.593 SNIP 1.651 CiteScore 3.76
Scopus rating (2013): SJR 1.724 SNIP 1.767 CiteScore 3.92
Scopus rating (2012): SJR 1.818 SNIP 1.623 CiteScore 3.5
Scopus rating (2011): SJR 1.961 SNIP 1.515 CiteScore 3.61
Scopus rating (2010): SJR 1.867 SNIP 1.421
Scopus rating (2009): SJR 1.836 SNIP 1.573
Scopus rating (2008): SJR 1.651 SNIP 1.591
Scopus rating (2007): SJR 1.511 SNIP 1.616
Scopus rating (2006): SJR 1.416 SNIP 1.676
Scopus rating (2005): SJR 1.478 SNIP 1.563
Scopus rating (2004): SJR 1.633 SNIP 1.494
Scopus rating (2003): SJR 1.324 SNIP 1.324
Scopus rating (2002): SJR 0.912 SNIP 1.066
Scopus rating (2001): SJR 0.928 SNIP 0.975
Scopus rating (2000): SJR 0.876 SNIP 0.876
Scopus rating (1999): SJR 1.048 SNIP 0.846
Original language: English
DOIs:
10.1016/j.chemosphere.2010.05.007

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 9356
Research output: Scientific - peer-review » Article

The designing and the implementation of WWW-course &quoutelectricity, Electronics and Environment&quoute;

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Koskiranta, M., Lehtelä, R., Vesapuisto, M., Tepsa, K., Puro, H.
Pages: 75-78
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Elektronika ir Elektrotechnika
The students' feedback on WWW-course "Electricity, Electronics and Environment"

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Vesapuisto, M., Vekara, T., Korpinen, L., Koskiranta, M., Lehtelä, R.
Number of pages: 4
Pages: 99-102
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Elektronika ir Elektrotechnika
Volume: 102
Issue number: 6
ISSN (Print): 1392-1215
Ratings:
Scopus rating (2016): SJR 0.321 SNIP 0.668 CiteScore 0.85
Scopus rating (2015): SJR 0.347 SNIP 0.599 CiteScore 0.71
Scopus rating (2014): SJR 0.292 SNIP 0.653 CiteScore 0.66
Scopus rating (2013): SJR 0.252 SNIP 0.634 CiteScore 0.53
Scopus rating (2012): SJR 0.226 SNIP 0.71 CiteScore 0.49
Scopus rating (2011): SJR 0.203 SNIP 1.038 CiteScore 0.84
Scopus rating (2010): SJR 0.213 SNIP 0.3
Scopus rating (2009): SJR 0.19 SNIP 0.018
Original language: English
Links:
http://www.ktu.lt/lt/mokslas/zurnalai/meniu.asp

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 8436
Research output: Scientific - peer-review › Article

Towards balanced public-private co-operation in urban water management

General information
Turning up the heat on printability

General information
State: Published
Ministry of Education publication type: B1 Article in a scientific magazine
Organisations: Department of Energy and Process Engineering
Authors: Lahti, J., Tuominen, M.
Pages: 15-15
Publication date: 2010
Peer-reviewed: No

Publication information
Journal: Materials World
Volume: 18
Issue number: 10
ISSN (Print): 0967-8638
Ratings:
Scopus rating (2016): SJR 0.103
Scopus rating (2015): SJR 0.101 CiteScore 0
Scopus rating (2014): SJR 0.102 SNIP 0 CiteScore 0.03
Scopus rating (2013): SJR 0.107 SNIP 0 CiteScore 0.03
Scopus rating (2012): SJR 0.104 SNIP 0 CiteScore 0.04
Scopus rating (2011): SJR 0.103 SNIP 0 CiteScore 0.03
Scopus rating (2010): SJR 0.102 SNIP 0
Scopus rating (2009): SJR 0.103 SNIP 0
Scopus rating (2008): SJR 0.101 SNIP 0
Scopus rating (2007): SJR 0.104 SNIP 0
Scopus rating (2006): SJR 0.103 SNIP 0
Scopus rating (2005): SJR 0.103 SNIP 0.14
Scopus rating (2004): SJR 0.108 SNIP 0.184
Scopus rating (2003): SJR 0.108 SNIP 0.177
Scopus rating (2002): SJR 0.116 SNIP 0.034
Scopus rating (2001): SJR 0.111
Scopus rating (2000): SJR 0.109 SNIP 0
Scopus rating (1999): SJR 0.121 SNIP 0
Original language: English

Bibliographical note
Contribution: organisation=epr pap,FACT1=1
Source: researchoutputwizard
Source-ID: 8552
Research output: Scientific › Article

Unsteady computational methods to study jet behaviour in large fluidized bed boiler

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Energy and Process Engineering
Authors: Tiitinen, K., Ylitalo, M., Oksanen, A.
Number of pages: 22
Pages: 1-22
Publication date: 2010

Host publication information
Title of host publication: AFRC 2010 Pacific Rim Combustion Symposium, September 26-29, 2010 Sheraton Maui, Hawaii

Bibliographical note
Use of analytical expressions of convection in conjugated heat transfer problems

**General information**
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Energy and Process Engineering
Authors: Karvinen, R.
Number of pages: 13
Pages: 1-13
Publication date: 2010

**Host publication information**
Title of host publication: Proceedings of the International Heat Transfer IHTC-14, August 8-13, 2010, Washington DC, USA
Publisher: ASME
Links: http://asmeconferences.org/IHTC14

**Bibliographical note**
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 8301
Research output: Scientific - peer-review › Conference contribution

UV irradiation for Micropollutant removal from aqueous solution in the presence of H2O2

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering
Authors: Tuhkanen, T. A., Cajal Marinosa, P.
Pages: 295-320
Publication date: 2010

**Host publication information**
Title of host publication: Treatment of Micropollutants in Water and Wastewater. Integrated Environmental Technology Series
Editors: Virkutyte, J., Varma, R., Jegatheesan, V.
ISBN (Print): 1843393166

**Bibliographical note**
Contribution: organisation=keb kem,FACT1=1
Source: researchoutputwizard
Source-ID: 9423
Research output: Scientific - peer-review › Chapter

Verkoston varrella

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering
Authors: Rajala, R.
Pages: 184-229
Publication date: 2010

**Host publication information**
Title of host publication: Hyvän veden ja hyvien yhteyksien kaupunki : Riihimäen Veden historia
Publisher: TamPub
Vesihuollon haasteet ennen ja nyt

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 278-299
Publication date: 2010

**Host publication information**
Title of host publication: Hyvän veden ja hyvien yhteyksien kaupunki: Riihimäen Veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Pietilä, P., Katko, T.
ISBN (Print): 978-952-5571-29-5
Research output: Scientific - peer-review > Chapter

Vesihuollon historia pähkinänkuoressa

**General information**
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: University of Tampere
Authors: Juuti, P.
Pages: 300-313
Publication date: 2010

**Host publication information**
Title of host publication: Hyvän veden ja hyvien yhteyksien kaupunki: Riihimäen Veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Pietilä, P., Katko, T.
ISBN (Print): 978-952-5571-29-5
Research output: Scientific - peer-review > Chapter

Vesihuollon ylikunnalliset sopimukset lisääntymässä

**General information**
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Kurki, V.
Pages: 18-18
Publication date: 2010
Peer-reviewed: Unknown

**Publication information**
Journal: Kuntatekniikka
Issue number: 2
ISSN (Print): 1238-125X
Original language: Finnish
Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8493
Research output: Professional › Article

Vesi kuntayhteistyön voiteluaineena

General information
State: Published
Ministry of Education publication type: D5 Text book, professional manual or guide or a dictionary
Organisations: Department of Chemistry and Bioengineering
Authors: Pietilä, P., Katko, T., Kurki, V.
Number of pages: 111
Publication date: 2010

Publication information
Place of publication: Helsinki
Publisher: Kaks - Kunnallisalan kehittämissäätiö
ISBN (Print): 978-952-5801-23-1
Original language: Finnish

Publication series
Name: Kunnallisalan kehittämissäätiö tutkimusjulkaisut
Publisher: Kaks - Kunnallisalan kehittämissäätiö
Volume: 62
ISSN (Print): 1235-6956

Electronic versions:
pietila_vesihuolto_kuntayhteistyyn_voiteluaineena.pdf

Links:
http://urn.fi/URN:NBN:fi:tty-2011061714722

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8998
Research output: Professional › Book

Vesilinna, Riihimäen maamerkki

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Civil Engineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 148-183
Publication date: 2010

Host publication information
Title of host publication: Hyvän veden ja hyvien yhteyksien kaupunki : Riihimäen Veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Pietilä, P., Katko, T.
ISBN (Print): 978-952-5571-29-5
Links:
http://urn.fi/urn:isbn:978-951-44-8136-9
Research output: Scientific - peer-review › Chapter

Vesitalous - monipuolisesti vesialalta

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Chemistry and Bioengineering, Department of Chemistry and Bioengineering
Water and sanitation services in history: Motivations, expectations and experiences

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Juuti, P. S., Nygård, H., Katko, T. S.
Pages: 231-249
Publication date: 2010

Host publication information
Title of host publication: A History of Water, Series II, Volume 1: Ideas of Water from Ancient Societies to the Modern World
Editors: Tvedt, T., Oestigaard, T.
ISBN (Print): 978-1-84511-980-5

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8247
Research output: Scientific - peer-review › Chapter

Water and the city

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Authors: Katko, T. S., Juuti, P., Tempelhoff, J.
Pages: 213-234
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Environment and History
Volume: 16
Issue number: 2
ISSN (Print): 0967-3407
Ratings:
Scopus rating (2016): SJR 0.596 SNIP 0.883 CiteScore 0.56
Scopus rating (2015): SJR 0.604 SNIP 1.223 CiteScore 0.78
Scopus rating (2014): SJR 0.408 SNIP 1.238 CiteScore 0.78
Scopus rating (2013): SJR 0.261 SNIP 0.746 CiteScore 0.39
Scopus rating (2012): SJR 0.162 SNIP 0.583 CiteScore 0.36
Scopus rating (2011): SJR 0.168 SNIP 0.233 CiteScore 0.3
Scopus rating (2010): SJR 0.136 SNIP 0.62
Water, policy and governance

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Hukka, J. J., Castro, J. E., Pietilä, P. E.
Pages: 235-251
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Environment and History
Volume: 16
Issue number: 2
ISSN (Print): 0967-3407
Ratings:
Scopus rating (2016): SJR 0.596 SNIP 0.883 CiteScore 0.56
Scopus rating (2015): SJR 0.604 SNIP 1.223 CiteScore 0.78
Scopus rating (2014): SJR 0.408 SNIP 1.238 CiteScore 0.78
Scopus rating (2013): SJR 0.261 SNIP 0.746 CiteScore 0.39
Scopus rating (2012): SJR 0.162 SNIP 0.583 CiteScore 0.36
Scopus rating (2011): SJR 0.168 SNIP 0.233 CiteScore 0.3
Scopus rating (2010): SJR 0.136 SNIP 0.62
Scopus rating (2009): SJR 0.44 SNIP 0.973
Scopus rating (2008): SJR 0.364 SNIP 0.582
Scopus rating (2007): SJR 0.25 SNIP 0.932
Scopus rating (2006): SJR 0.432 SNIP 0.861
Scopus rating (2005): SJR 0.261 SNIP 0.302
Scopus rating (2004): SJR 0.318 SNIP 0.805
Scopus rating (2003): SJR 0.35 SNIP 0.773
Scopus rating (2002): SJR 0.235 SNIP 0.642
Scopus rating (2001): SJR 0.115 SNIP 0.236
Scopus rating (2000): SJR 0.165
Scopus rating (1999): SJR 0.166

Original language: English
DOIs:
10.3197/096734010X12699419057331

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 8313
Research output: Scientific - peer-review › Article
Yhdysvaltain vesihuollossa julkissektorin avainasemassa. Haasteina niukentuvien vesivarojen hallinta ja ikääntyvä infrastrukturi!

**General information**

State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Pages: 44-47
Publication date: 2010
Peer-reviewed: Unknown

**Publication information**

Journal: Kuntatekniikka
Issue number: 8
ISSN (Print): 1238-125X
Original language: Finnish

**Effect of geometrical parameters on vortex-induced vibration of a splitter plate**

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Pärssinen, T., Eloranta, H., Saarenrinne, P.
Number of pages: 9
Pages: 1-9
Publication date: 2009
Peer-reviewed: Yes

**Publication information**

Journal: Journal of Fluids Engineering: Transactions of the ASME
Volume: 131
Issue number: 3, 031203
ISSN (Print): 0098-2202
Ratings:

Scopus rating (2016): SJR 0.646 SNIP 1.242 CiteScore 1.45
Scopus rating (2015): SJR 0.728 SNIP 1.335 CiteScore 1.41
Scopus rating (2014): SJR 0.629 SNIP 1.355 CiteScore 1.32
Scopus rating (2013): SJR 0.678 SNIP 1.295 CiteScore 1.21
Scopus rating (2012): SJR 0.586 SNIP 1.271 CiteScore 0.95
Scopus rating (2011): SJR 0.553 SNIP 1.088 CiteScore 0.89
Scopus rating (2010): SJR 0.538 SNIP 1.127
Scopus rating (2009): SJR 0.543 SNIP 1.048
Scopus rating (2008): SJR 0.656 SNIP 1.386
Scopus rating (2007): SJR 0.656 SNIP 1.054
Scopus rating (2006): SJR 0.893 SNIP 1.304
Scopus rating (2005): SJR 1.105 SNIP 1.421
Ensimmäiset fuusiosuunnitelmat

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 39-76
Publication date: 2009

Host publication information
Title of host publication: Vesihuoltoyhteistyötä yli rajojen : PK-seudun yhteistyöhankkeet ja yhdistämissuunnitelmat ennen ja nyt Espoon näkökulmasta
Publisher: University of Tampere
Editors: Juuti, P., Rajala, R.
ISBN (Print): 978-951-857-559-0
Research output: Scientific - peer-review › Chapter

Fire, Thirst, Health and Hygiene: Root Causes for the Introduction of Water Supply and Sanitation in Kajaani

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R., Katko, T. S.
Pages: 275-286
Publication date: 2009

Host publication information
Title of host publication: Elämän virta : Kajaanin veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
ISBN (Print): 978-951-800-320-8
ISBN (Electronic): 978-951-44-7657-0
Links: http://urn.fi/urn:isbn:978-951-44-7657-0
Research output: Scientific - peer-review › Chapter

Hybrid barrier films by atmospheric inline plasma deposition on sol-gel coated PE-cardboard

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Energy and Process Engineering
Authors: Nättinen, K., Nikkola, J., Mannila, J., Vartiainen, J., Tuominen, M., Lavonen, J.
Pages: 8 p
Kokemus: Kajaanin vesihuollon ammattilaisten kokemukset ja näkemykset

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R., Katko, T. S.
Pages: 175-228
Publication date: 2009

Host publication information
Title of host publication: Elämän virta : Kajaanin veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
ISBN (Print): 978-951-800-320-8
ISBN (Electronic): 978-951-44-7657-0
Links: http://urn.fi/urn:isbn:978-951-44-7657-0
Research output: Scientific - peer-review › Chapter

Loppulu – haasteita riittää tulevaisuuteen

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: University of Tampere
Authors: Juuti, P. S., Rajala, R.
Pages: 131-144
Publication date: 2009

Host publication information
Title of host publication: Vesihuoltoyhteistyötä yli rajojen : PK-seudun yhteistyöhankkeet ja yhdistämissuunnitelmat ennen ja nyt Espoon näkökulmasta
Publisher: University of Tampere
Editors: Juuti, P., Rajala, R.
ISBN (Print): 978-951-857-559-0
Research output: Scientific - peer-review › Chapter

Lähde: Pohjavedenottamat

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R., Katko, T. S.
Pages: 93-136
Publication date: 2009

Host publication information
Title of host publication: Elämän virta : Kajaanin veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
Mental symptoms and the use of new technical equipment

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Energy and Process Engineering
Authors: Korpinen, L., Pääkkönen, R.
Pages: 385-400
Publication date: 2009
Peer-reviewed: Yes

Publication information
Journal: International Journal of Occupational Safety and Ergonomics
Volume: 15
Issue number: 4
ISSN (Print): 1080-3548
Ratings:
Scopus rating (2016): SJR 0.259 SNIP 0.673 CiteScore 0.64
Scopus rating (2015): SJR 0.284 SNIP 0.729 CiteScore 0.65
Scopus rating (2014): SJR 0.23 SNIP 0.62 CiteScore 0.56
Scopus rating (2013): SJR 0.232 SNIP 0.853 CiteScore 0.65
Scopus rating (2012): SJR 0.344 SNIP 0.732 CiteScore 0.77
Scopus rating (2011): SJR 0.286 SNIP 0.578 CiteScore 0.39
Scopus rating (2010): SJR 0.221 SNIP 0.341
Scopus rating (2009): SJR 0.272 SNIP 0.673
Scopus rating (2008): SJR 0.369 SNIP 0.488
Scopus rating (2007): SJR 0.431 SNIP 0.618
Scopus rating (2006): SJR 0.205 SNIP 0.427
Scopus rating (2005): SJR 0.216 SNIP 0.257
Scopus rating (2004): SJR 0.224 SNIP 0.45
Scopus rating (2003): SJR 0.19 SNIP 0.344
Scopus rating (2002): SJR 0.205 SNIP 0.403
Scopus rating (2001): SJR 0.141 SNIP 0.333
Scopus rating (2000): SJR 0.136 SNIP 0.264
Scopus rating (1999): SJR 0.197 SNIP 0.372
Original language: English
Links:
http://www.ciop.pl/jose

Bibliographical note
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 10519
Research output: Scientific - peer-review › Article

Missä, missä se kaivo on?

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T.
Pages: s. 8
Publication date: 2009
Moro-suihkukaivo olisi hyvää saada myös Tampereelle!

Palo, jano, terveys, hygienia

Päijänne-tunneli ja kolmisopimus
Vesi: Vesilaitoksen alkutaival 1920-luvulta 1970-luvulle

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R., Katko, T. S.
Pages: 65-92
Publication date: 2009

Host publication information
Title of host publication: Elämän virta: Kajaanin veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
ISBN (Print): 978-951-800-320-8
ISBN (Electronic): 978-951-44-7657-0
Links:
http://urn.fi/urn:isbn:978-951-44-7657-0
Research output: Scientific - peer-review › Chapter

Vesihuoltoa espoossa ennen kunnallista vesilaitosta

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 5-26
Publication date: 2009

Host publication information
Title of host publication: Vesihuoltoyhteistyötä yli rajojen: PK-seudun yhteistyöhankkeet ja yhdistämissuunnitelmat ennen ja nyt Espoon näkökulmasta
Publisher: University of Tampere
Editors: Juuti, P., Rajala, R.
ISBN (Print): 978-951-857-559-0
Research output: Scientific - peer-review › Chapter

Virta: Kajaani, kaupunki joen varrella

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R., Katko, T. S.
Pages: 21-36
Publication date: 2009

Host publication information
Title of host publication: Elämän virta: Kajaanin veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
ISBN (Print): 978-951-800-320-8
ISBN (Electronic): 978-951-44-7657-0
Links:
http://urn.fi/urn:isbn:978-951-44-7657-0
Research output: Scientific - peer-review › Chapter
Visio: Historian havinaa ja tulevaisuuden haasteita

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R., Katko, T. S.
Pages: 257-270
Publication date: 2009

Host publication information
Title of host publication: Elämän virta : Kajaanin veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
ISBN (Print): 978-951-800-320-8
ISBN (Electronic): 978-951-44-7657-0
Links:
http://urn.fi/urn:isbn:978-951-44-7657-0
Research output: Scientific - peer-review › Chapter

Yhdistymishankkeet 2000-luvulla

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 77-130
Publication date: 2009

Host publication information
Title of host publication: Vesihuoltoyhteistyötä yli rajojen : PK-seudun yhteistyöhankkeet ja yhdistämissuunnitelmien naismaa ja nyt Espoon näkönkulmasta
Publisher: University of Tampere
Editors: Juuti, P., Rajala, R.
ISBN (Print): 978-951-857-559-0
Research output: Scientific - peer-review › Chapter

Yhteistyö

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R., Katko, T. S.
Pages: 229-256
Publication date: 2009

Host publication information
Title of host publication: Elämän virta : Kajaanin veden historia
Publisher: TamPub
Editors: Juuti, P., Rajala, R., Katko, T.
ISBN (Print): 978-951-800-320-8
ISBN (Electronic): 978-951-44-7657-0
Links:
http://urn.fi/urn:isbn:978-951-44-7657-0
Research output: Scientific - peer-review › Chapter

Changing energy production structures and CO2 emissions in the ASEAN countries: Decomposition analysis of drivers behind the changes

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Rural electrification of remote areas - Case studies of two renewable energy projects in Laos and The Philippines

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Energy and Process Engineering
Authors: Mustonen, S.
Pages: 8 p
Publication date: 2008

Host publication information
Title of host publication: International Conference on Environment 2008 (ICENV 2008), 15-17 December, 2008, Penang, Malaysia

Bibliographical note
Conference Proceedings CD-Rom / electronic
Contribution: organisation=epr,FACT1=1
Source: researchoutputwizard
Source-ID: 13098
Research output: Scientific › Conference contribution

Tausta: Jätevedenpuhdistuksen alku, tehtävän määrittely ja keskeiset käsitteet

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 7-18
Publication date: 2008

Host publication information
Title of host publication: Ei jätevedenpuhdistamoa minun takapihalleni : Jätevedenpuhdistuksen päätöksenteko, pääätäntäprosessit ja julkinen keskustelu Espoossa historiassa, nyt ja taelvaisuudessa
Publisher: TamPub
Editors: Juuti, P., Rajala, R.
ISBN (Print): 978-951-857-540-8
Links:
Research output: Scientific › Chapter

Tutkimustoiminnalla turvallisuutta ja toimintavarmuutta: päätös panostaa omaan jättevesilaboratorioon

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Chemistry and Bioengineering, University of Tampere
Authors: Juuti, P., Rajala, R.
Pages: 77-84
Publication date: 2008
Birth and expansion of public water supply and sanitation in Finland until World War II

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristöteknikka, Former organisation of the author
Authors: Juuti, P., Katko, T.
Pages: 117-130
Publication date: 2007

Host publication information
Title of host publication: Environmental History of Water - Global views on community water supply and sanitation
Editors: Juuti, P., Katko, T., Vuorinen, H.

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14274
Research output: Scientific - peer-review › Anthology

Conclusions

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristöteknikka, Former organisation of the author
Authors: Juuti, P. S., Katko, T. S., Vuorinen, H. S.
Pages: 259-262
Publication date: 2007

Host publication information
Title of host publication: 2007. Environmental History of Water - Global views on community water supply and sanitation. IWA Publishing
Editors: Juuti P.S., K. T., Vuorinen, H.

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14486
Research output: Scientific - peer-review › Chapter

Conclusions

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristöteknikka, Former organisation of the author
Authors: Juuti, P. S., Katko, T. S., Vuorinen, H. S.
Pages: 501-506
Publication date: 2007

Host publication information
Title of host publication: 2007. Environmental History of Water - Global views on community water supply and sanitation. IWA Publishing
Hydrolysed cellulose material as sulfate reduction electron donor to treat metal- and sulfate containing waste water

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Former organisation of the author
Authors: Lakaniemi, A., Nevatalo, L., Kaksonen, A., Puhakka, J.
Pages: 326-326
Publication date: 2007
Peer-reviewed: Yes

Publication information
Journal: Advanced Materials Research
Volume: 20-21
ISSN (Print): 1022-6680
Ratings:
Scopus rating (2016): SJR 0.12 SNIP 0.154
Scopus rating (2015): SJR 0.115 SNIP 0.106 CiteScore 0.08
Scopus rating (2014): SJR 0.141 SNIP 0.171 CiteScore 0.09
Scopus rating (2013): SJR 0.143 SNIP 0.203 CiteScore 0.11
Scopus rating (2012): SJR 0.136 SNIP 0.265 CiteScore 0.12
Scopus rating (2011): SJR 0.15 SNIP 0.385 CiteScore 0.19
Scopus rating (2010): SJR 0.155 SNIP 0.232
Scopus rating (2009): SJR 0.168 SNIP 0.254
Scopus rating (2008): SJR 0.169 SNIP 0.238
Scopus rating (2007): SJR 0.186 SNIP 0.657
Scopus rating (2006): SJR 0.251 SNIP 0.598
Original language: English
DOIs:
10.4028/www.scientific.net/AMR.20-21.326

Ilmasto muuttuu, riittääkö vesi?

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Bio- ja ympäristötieteen, Former organisation of the author
Authors: Juuti, P., Katko, T.
Publication date: 2007
Peer-reviewed: Unknown

Publication information
Journal: Aamulehti
ISSN (Print): 0355-6913
Original language: English
Managing water and sewerage services in a cold, four-seasons climate

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Bio- ja ympäristötöekniikka
Authors: Hukka, J., Katko, T., Pietilä, P., Vinnari, E.
Pages: 17-18
Publication date: 2007

Host publication information
Title of host publication: Proceedings of the 8th ISCORD Symposium, Tampere, Finland, September 25-27, 2007

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14483
Research output: General public › Article

Part I: Early systems and innovations. Ch 3 Introduction: Early cultures and water

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristötöekniikka, Former organisation of the author
Authors: Juuti, P. S., Katko, T. S., Vuorinen, H. S.
Pages: 11-16
Publication date: 2007

Host publication information
Title of host publication: 2007. Environmental History of Water - Global views on community water supply and sanitation.
IWA Publishing
Editors: Juuti P.S., K. T., Vuorinen, H.

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14498
Research output: Scientific - peer-review › Chapter

Part III: Modern Urban Infrastructure. Ch 20 Introduction

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristötöekniikka, Former organisation of the author
Authors: Juuti, P. S., Katko, T. S., Vuorinen, H. S.
Pages: 509-510
Publication date: 2007

Host publication information
Title of host publication: 2007. Environmental History of Water - Global views on community water supply and sanitation.
IWA Publishing
Editors: Juuti P.S., K. T., Vuorinen, H.

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14500
Part III: Modern Urban Infrastructure. Ch 20 Introduction

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristötekniikka, Former organisation of the author
Authors: Juuti, P. S., Katko, T. S., Vuorinen, H. S.
Pages: 265-270
Publication date: 2007

Host publication information
Title of host publication: 2007. Environmental History of Water - Global views on community water supply and sanitation.
IWA Publishing
Editors: Juuti P.S., K. T., Vuorinen, H.

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14501
Research output: Scientific - peer-review › Chapter

Part III: Modern urban infrastructure. Introduction

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristötekniikka, Former organisation of the author
Authors: Juuti, P., Katko, T., Vuorinen, H.
Pages: 265-269
Publication date: 2007

Host publication information
Title of host publication: Environmental History of Water - Global views on community water supply and sanitation
Editors: Juuti, P., Katko, T., Vuorinen, H.

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14491
Research output: Scientific - peer-review › Chapter


General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristötekniikka, Former organisation of the author
Authors: Juuti, P. S., Katko, T. S., Vuorinen, H. S.
Number of pages: 4
Pages: 99-102
Publication date: 2007

Host publication information
Title of host publication: 2007. Environmental History of Water - Global views on community water supply and sanitation.
IWA Publishing
Editors: Juuti P.S., K. T., Vuorinen, H.

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14499
Research output: Scientific - peer-review › Chapter
Environmental history of water: Global view of community water supply and sanitation

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Bio- ja ympäristöteknikka, Former organisation of the author
Authors: Juuti, P., Katko, T., Vuorinen, H.
Pages: 631-636
Publication date: 2006

Host publication information
Title of host publication: Symposium Preprint Book: 1st IWA International Symposium on Water and Wastewater Technologies in Ancient Civilizations, Iraklio, Greece, 27.10.2006

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 16568
Research output: Scientific - peer-review › Conference contribution

Modeling of autonomous power systems - A mathematical model of a hybrid power system

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Energia- ja prosessiteknikka
Authors: Mustonen, S., Nanthavong, K.
Pages: 6 p
Publication date: 2006

Host publication information
Title of host publication: Proceedings of the 2nd Joint International Conference on "Sustainable Energy and Environment (SEE 2006)" 21-23 November, 2006, Bangkok, Thailand

Bibliographical note
Contribution: organisation=ener,FACT1=1
Source: researchoutputwizard
Source-ID: 17171
Research output: Scientific › Conference contribution

Vesihuollolla voidaan myös paikata kuntataloutta

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Bio- ja ympäristöteknikka
Authors: Hukka, J., Katko, T., Pietilä, P.
Pages: s. 19
Publication date: 2006
Peer-reviewed: Unknown

Publication information
Journal: Kauppalehti
Original language: English

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 16446
Research output: General public › Article
Long-term strategic decisions in 13 countries and 29 cities

General information
State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Bio- ja ympäristötekniikka, Former organisation of the author
Authors: Juuti, P. S., Katko, T. S.
Pages: 50-72
Publication date: 2005

Host publication information
Title of host publication: Water, Time and European Cities. History matters for the Futures
Place of publication: Tampere
Publisher: Tampere University Press
Editors: Juuti, P. S., Katko, T. S.
ISBN (Print): 951-44-6337-4
Links:
http://urn.fi/urn:isbn:951-44-6337-4

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 18530
Research output: Scientific › peer-review › Chapter

Viinikanlahden siirto vielä harkintaan

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Bio- ja ympäristötekniikka, Former organisation of the author
Authors: Juuti, P., Katko, T.
Publication date: 2005
Peer-reviewed: Unknown

Publication information
Journal: Aamulehti
ISSN (Print): 0355-6913
Original language: English

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 18524
Research output: General public › Article

Water, Time and European Cities : History matters for the Futures

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Bio- ja ympäristötekniikka, Department of Civil Engineering, Former organisation of the author
Authors: Juuti, P. S. (ed.), Katko, T. S. (ed.)
Publication date: 2005

Publication information
Comparison of the total mercury content in sediment samples with a mercury sensor bacteria test and Vibrio fischeri toxicity test

The suitability of a luminescent bacterial sensor strain Escherichia coli MC1061(pTOO11) [Virta, M.; Lampinen, J.; Karp, M. Anal Chem 1995, 67, 667-669] for the measuring of mercury from sediment samples was evaluated. The sensor strain is based on the control of expression of a reporter gene, firefly luciferase, by a mercury sensitive regulation unit. The sensor responds to mercury by increased luminescence as a consequence of increased production of the reporter protein luciferase. The method is simple to perform since the luminescence is recorded with a portable luminometer and the sensor bacteria are freeze-dried. The results obtained from river sediment samples were compared with the total mercury content of the samples, which was measured by atomic absorption spectrometry and Leco(R) Mercury analyzer and the modified photobacteria luminescence inhibition test (Lappalainen, J.; Juvonen, R.; Vaajasaari, K.; Karp, M. Chemosphere 1999, 38, 1069-1083). The correlation between the bacterial sensor results with the total mercury content, ranging from 0.01 mg/kg to 16 mg/kg, was significant with 32 samples tested (R-2 UP to 0.8115). There was no correlation between the total mercury content and toxicity measured with Vibrio fischeri in this sample panel, (C) 2000 by John Wiley & Sons, Inc.
Detecting bioavailable toxic metals and metalloids from natural water samples using luminescent sensor bacteria

We have generated microbial sensors for analyzing the presence of various metals or metalloids by recombinant DNA technology. The strains are based on strictly regulated promoters controlling the expression of the firefly luciferase gene in microbial cells. The regulator-reporter constructs are located in shuttle plasmids capable of replicating in gram-negative or -positive microbial organisms. The sensors developed are real-time indicators of metal responsive gene expression giving results in approximately 30 min, with optimal induction times ranging from 60 to 240 min. We describe here the performance of these metal sensing bacteria for the assessment of different water samples spiked with lead, arsenic, mercury or cadmium. We show that these bacteria are sensitive detectors of metal bioavailability, which is difficult or even impossible to measure by traditional analytical chemistry methods. All measurements were done using freeze-dried bacteria, which makes these sensors reagent-like and also easy to use in field conditions. (C) 2000 Elsevier Science Ltd. All rights reserved.
Full scale landfill bottom liner test structures at Ämmässuo landfill, Espoo, Finland

Full scale test structures were constructed in summer 1996 to the Ämmässuo landfill to gather experience on quality control during the construction and long term behaviour of mineral liner and combination liners. Actual leachate was used to create the chemical loading and a hydraulic pressure of one meter. The leachate was implemented in October 1996, and the structures were monitored for two years. The structures were continuously monitored by temperature and soil moisture sensors installed into the liner. The leachate seeping through the liner structure was collected to the lysimeter basins and further to the lysimeter wells, in which the amount of the water was measured automatically by pressure sensors. In addition, frost penetration and infiltrometer measurements were performed and samples were taken for laboratory tests during the two-year period. The structures were pulled down under control in November 1998.

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: SCC Viatek Ltd.
Authors: Leppänen, M., Kaartokallio, A., Loukola, E.
Number of pages: 8
Pages: 173-180
Publication date: Oct 1999

Host publication information
Volume: III
Editors: Christensen, T. H., Cossu, R., Stegmann, R.
Keywords: Landfill
Research output: Scientific › Conference contribution

Water supply and sanitation as an entry point to human development: Vision21- Knowledge synthesis.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Bio- ja ympäristöteknika
Authors: Hukka, J., Katko, T. S.
Publication date: 1999
Peer-reviewed: Yes

Publication information
Original language: English

Bibliographical note
<www.wsscc.org/vision21/docs/index.html>
Research output: Scientific › Conference contribution

A recombinant Escherichia coli sensor strain for the detection of tetracyclines

A bioluminescent Escherichia coli K-12 strain for the specific detection of the tetracycline group of antibiotics is described, A sensor plasmid, containing five genes from bacterial luciferase operon of Photorhabdus luminescens inserted under the control of tetracycline-responsive elements of the transposon Tn10, was constructed. Usage of the full-length luciferase operon in the sensor resulted in tetracycline-dependent light production without additions, i.e., self-luminescent phenotype, since all the substrates were intrinsically produced by the recombinant organism, The time needed for optimal induction of light emission was 90 min. Maximal induction of similar to 100-fold over uninduced levels by using 20 ng of tetracycline,
and picomole sensitivities for the seven different tetracyclines tested, were obtained without added Mg2+ ions. The higher the pH and the magnesium ion concentration in the assay medium the higher was the amount of membrane-impermeable tetracycline-Mg2+ chelate complex. In consequence, by adjusting the pH and the Mg2+ ion concentration, the sensitivity of the assay can be modified for different analytical purposes. Different non-tetracycline antibiotics did not cause induction of light emission.

The need for "champions" in rural water supply

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Bio- ja ympäristötäkiikka
Authors: Katko, T. S.
Pages: 19-22
Publication date: 1994
Peer-reviewed: Yes

Publication information
