Proceedings of the 2nd Annual SMACC Research Seminar 2017

The Annual SMACC Research Seminar is a forum for researchers from VTT Technical Research Centre of Finland Ltd, Tampere University of Technology (TUT) and industry to present their research in the area of smart machines and manufacturing. The 2nd seminar is held in 7th of November 2017 in Tampere, Finland.

The objective of the seminar is to publish results of the research to wider audiences and to offer researchers a forum to discuss their research and to find common research interests and new research ideas.

Smart Machines and Manufacturing Competence Centre - SMACC is joint strategic alliance of VTT Ltd and TUT in the area of intelligent machines and manufacturing. SMACC offers unique services for SME’s in the field of machinery and manufacturing - key features are rapid solutions, cutting-edge research expertise and extensive partnership networks. SMACC is promoting digitalization in mechanical engineering and making scientific research with domestic and international partners in several different topics (www.smacc.fi).

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Mechanical Engineering and Industrial Systems
Authors: Aaltonen, J., Koskinen, K., Virkkunen, R., Kuivanen, R.
Number of pages: 62
Publication date: 7 Nov 2017

Publication information
Place of publication: Tampere
Publisher: Tampere University of Technology
ISBN (Print): 978-952-15-4040-0
Original language: English
ASJC Scopus subject areas: Engineering(all)
Electronic versions:
Proceedings of the 2nd Annual SMACC reseach Seminar 2017
Links:
http://urn.fi/URN:NBN:fi tty-201712222491
Research output: Scientific - peer-review › Anthology

Utilization of Models for Online Estimation in Combustion Applications
The emerging environmental and energy system related requirements urge renewed combustion systems, with a focus on extended flexibility and decreased emissions. At the same time, monitoring and measurement reliability requirements are increasing. All these requirements also increasingly affect existing combustion plants.

To tackle the increasing needs and requirements of existing combustion processes, this thesis’ objective is to integrate process and domain knowledge, models, and online estimation to provide cost effective and practically feasible solutions for online emission monitoring and control in existing combustion processes. These solutions are domain specific, comprising power level, main fuel, boiler technology, process environment, and market. This thesis presents a framework to provide practically justified, online monitoring and control solutions that is applied to selected combustion applications.

The first application is combustion control of small-scale (<0.5 MW) wood chip combustion systems, to tackle fuel feed disturbances and provide stabilized combustion conditions with improved process performance. The second application area is medium-scale (15 MW – 50 MW) natural gas fired boilers. Indirect, data based, NOx monitoring methods were developed for such boilers, to cost effectively fulfil emerging monitoring requirements. The third application area is large-scale power plants (>100 MW). A novel, first principle combustion model was developed for these. The generic combustion model interlinks the combustion related measurements distributed within any boilers regardless of boiler type or fuels. The interlinking enables combustion processes to be considered as an entity that reveals if a measurement provide realistic readings compared with others. The static, computationally light model enables simultaneous data reconciliation and gross error detection and hence several attractive online applications, such as reliable estimation of unmeasured variables, and separation of process disturbances from sensor malfunctions.

The results verify that the process performance improved in all studied practical applications, providing feasible solutions for increasing requirements.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Automation and Hydraulic Engineering
Authors: Korpela, T.
Number of pages: 84
Publication date: 13 Oct 2017
Performance evaluation of the sizing capabilities of a new diffusion charging based particle sensor

Pegasor's AQ Indoor sensor (AQI) uses a new method for evaluating the count median diameter (CMD) of an aerosol (Saukko, 2016). A modified ion trap cycles voltages from 1 to 1000 V, trapping charged particles along with ions. The larger the particles, the lower their electrical mobility and the larger the trap voltage needed to remove them.

Utilization of Drum Boilers' Storage Capacity for Flexible Operation

Due to increasing amount of intermittent and uncontrollable renewable energy production and reducing amount of stabilizing inertia in power systems, requirements for improved dynamic performance of controllable steam boilers will increase remarkably. Load tracking capacity of steam boilers consists of utilization of fast responding energy storages in boiler structures and change rate of available combustion power. This paper presents results of a simulation based dynamic analysis of the transient operation of a steam boiler exposed to fast load change. The results are evaluated against the requirements set by the maximum allowed thermal stresses in boiler structures and stability of steam parameters set by steam turbine operation. This project is a part of the FLEXe (Flexible Future Energy Systems) research program coordinated by CLIC Innovation Ltd and funded by the Finnish Funding Agency for Innovation TEKES.
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

Driving condition dependent secondary particle formation from a gasoline direct injection vehicle: effect of fuel ethanol content

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Department of Physics, Research area: Aerosol Physics
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Extending Particle Number Limits to below 23 nm: First Results of the H2020 DownToTen Project

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Graz University of Technology, Ricardo Ltd, AVL List GmbH, European Commission-JRC, Technical University Munich, CRF, Aristotle University of Thessaloniki
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at EAC 2017, European Aerosol Conference, 27 August - 1 September, Zürich, Switzerland, Zürich, Switzerland.
Research output: Scientific › Paper, poster or abstract

Extending Particle Number Limits to below 23 nm: First Results of the H2020 DownToTen Project

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, European Commission-JRC, Aristotle University of Thessaloniki, Aristotele University of
Impact of Exhaust Aftertreatment and Fuel on Primary and Secondary Particulate Emissions of a Non-Road Diesel Engine

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research area: Aerosol Physics, Turk University of Applied Sciences, AGCO Power, Dinex Ecocat Oy
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

Implications for the Sampling System in Extending Automotive Particle Regulations below 23 nm: First Results of the DownToTen Project

General information
State: Published
Organisations: Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research area: Aerosol Physics, AVL List GmbH, European Commission-JRC, Aristotle University of Thessaloniki, Aristotele University of Tesseloniki
Authors: Karjalainen, P., Keskinen, J., Bainschab, M., Bergmann, A., Jon, A., Mamakos, A., Klug, A., Giechaskiel, B., Piacenza, O., Christoph, H., Ntziachristos, L., Samaras, Z.
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific › Paper, poster or abstract

PEMS measurements of particle number and mass emissions from loaders using conventional and renewable diesel fuels

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Karjalainen, P., Järvinen, A., Wihersaari, H., Nuottimäki, J., Kytö, M., Keskinen, J., Rönkkö, T.
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at 7th PEMS Conference & Workshop, Riverside, United States.
Research output: Scientific › Paper, poster or abstract

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) landfilled 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: 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
Early online date: 16 Nov 2016

**Publication information**

Journal: Waste Management
Volume: 60
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
Keywords: Aerobic stabilization, Anaerobic stabilization, Fine fraction, Landfill mining, Leachate
DOIs:
10.1016/j.wasman.2016.11.015
Source: RIS
Source-ID: urn:592197DDB3F400BDF07AF04E54A2897D
Research output: Scientific › peer-review › Article

Secondary aerosol formation potential reduction from a non-road diesel engine with exhaust aftertreatment systems

**General information**

State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Publication date: 2017
Peer-reviewed: Unknown
Event:
Research output: Scientific › Paper, poster or abstract
Sensitivity analysis of a model characterizing nanoparticle agglomeration, dispersion and deposition processes in the atmosphere

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research group: Aerosol Synthesis
Authors: Poikkimäki, M., Juuti, P., Kalliokoski, J., Dal Maso, M.
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at 8th International Symposium on Nanotechnology, Occupational and Environmental Health
Research output: Scientific > Paper, poster or abstract

Sensitivity analysis of a model characterizing nanoparticle agglomeration, dispersion and deposition processes in the atmosphere
Abstract T104N388

General information
State: Published
Organisations: Faculty of Natural Sciences, Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research group: Aerosol Synthesis
Authors: Poikkimäki, M., Juuti, P., Kalliokoski, J., Dal Maso, M.
Publication date: 2017
Peer-reviewed: Unknown
Research output: Scientific > Paper, poster or abstract

Total Particle Number Concentration and Particle Size Distribution of Nanoparticles from Real- scale Pulverized Solid Fuel Combustion

General information
State: Published
Organisations: Physics, Research area: Aerosol Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Department of Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Publication date: 2017
Peer-reviewed: Unknown
Event: Paper presented at 21th ETH Conference on Combustion Generated Particles, Zürich, Switzerland.
Research output: Professional > Paper, poster or abstract

Conversion of Iterative Balance Models to Directly Calculating Explicit Models for Real-time Process Optimization and Scheduling
Optimal utilization of complex processes involves real-time operational optimization and scheduling, especially in cases where the production line consists of both continuous and batch operated unit processes. This kind of real-time optimization requires process models which can be computed significantly faster than real-time. Iterative balance calculation is typically far too slow for these cases. This paper presents a method for converting an iterative balance model to a directly calculating model suitable for on-line process optimization. The approach is demonstrated with the first unit process in the copper smelting line, the flash smelting furnace (FSF). The method consisted of formulating an equation group based on the constrained FSF HSC-Sim model and solving the unknown parameters and static states with use of a symbolic calculation software. The solution was implemented as a function whose calculation time fulfilled the requirements for scheduling use.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Authors: Björkvist, T., Suominen, O., Vilkko, M., Korpi, M.
Pages: 257-266
Publication date: Dec 2016
Particle charge-size distribution measurement using a differential mobility analyzer and an electrical low pressure impactor

General information
State: E-pub ahead of print
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Järvinen, A., Heikkilä, P., Keskinen, J., Yli-Ojanperä, J.
Pages: 1-10
Publication date: 2 Nov 2016
Peer-reviewed: Yes

Performance of a sonic jet-type charger in high dust load
Sonic jet chargers have originally been used in aerosol measurement devices for particle charging and neutralization. Here, our goal was to study if this charger type could be used in particle control devices in which particle concentrations and gas volumes are much higher. The study includes charging efficiency tests in a laboratory and with a commercial 20 kW wood pellet burner. Actual particle removal efficiency was tested with a laboratory scale parallel plate electrostatic collector. The results show that sonic jet-type chargers also have potential in filtering applications.
From Iterative Balance Models to Directly Calculating Explicit Models for Real-time Process Optimization and Scheduling

Optimal utilization of complex processes involves real-time operational optimization and scheduling, especially in cases where the production line consists of both continuous and batch operated unit processes. This kind of real-time optimization requires process models which can be computed significantly faster than real-time. Iterative balance calculation is typically far too slow for these cases. This paper presents a method for converting an iterative balance model to a directly calculating model suitable for online process optimization. The approach is demonstrated with the first unit process in the copper smelting line, the flash smelting furnace (FSF). The method consisted of formulating an equation group based on the constrained FSF HSC-Sim model and solving the unknown parameters and static states with use of a symbolic calculation software. The solution was implemented as a function whose calculation time fulfilled the requirements for scheduling use.

Mitigation of propylene glycol emissions to groundwater and soil

Background
Propylene glycol based deicing agents are used at airports to remove ice and prevent ice accumulation into airplanes. Propylene glycol is readily biodegradable both aerobically and anaerobically but it has been noticed to migrate into groundwater (Greco et al., 2012). Currently propylene glycol emissions are collected and treated at municipal treatment plants. More information is needed about mitigation measures to prevent propylene glycol emissions into ground water and soil.

Aim
The objective of current study was to study whether low cost materials can improve propylene glycol degradation in soil and decrease its migration into groundwater and soil at low temperatures. The low cost materials were chosen based on literature survey and small scale laboratory experiments as well as technical parameters and current use at Finnish airport structures. Experiments were carried out in two pilot-scale temperature controlled lysimeters (height 3 m, radius 50 cm) operated at -5 to 20°C, i.e. simulating winter, spring and summer conditions to compare control lysimeter and amended lysimeter. Deicing agent was mixed with flake ice in order to simulate snow and added on top of the soil and/or amendments. The purpose was to find out whether addition of peat and blast furnace sand can mitigate propylene glycol
Lysimeter leachate formation and migration of propylene glycol into lysimeter leachate were minimal when the soil was frozen. Biodegradation of propylene glycol was detected as formation of its degradation products in both lysimeters after the soil temperature had increased above 0 °C. However, comparison of results from control lysimeter and lysimeter amended with peat and blast furnace sand revealed that the amendments did not improve biodegradation of propylene glycol nor decrease its migration into lysimeter leachate.

General information
State: Published
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry, Tampere University of Technology, Finavia Oy
Authors: Palmroth, M. R. T., Pispa, L., Kettunen, R. H., Hänninen, T., Rintala, J. A.
Pages: 191
Publication date: 5 Sep 2016
Peer-reviewed: Unknown
ASJC Scopus subject areas: Environmental Engineering
Links:
http://nordrocs.org/ (Conference website)
Research output: Scientific › Paper, poster or abstract
Tuntemalla olosuhteet voi optimoida materiaalit kulutussouvelluksilin

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Materials Science, Research group: Materials Characterization
Authors: Ratia, V., Ojala, N., Valtonen, K., Heino, V.
Pages: 16-20
Publication date: May 2016
Peer-reviewed: Unknown

Publication information
Journal: Promaint
Volume: 3
ISSN (Print): 1797-2000
Original language: Finnish
Keywords: Kuluminen, Kaivosteollisuus, Teräs, Testaus, Kunnossapito
ASJC Scopus subject areas: Materials Science(all), Engineering(all)
Electronic versions:
proMAINT_julkaistu
Links:
http://urn.fi/URN:NBN:fi:tty-201606134230
Research output: Professional › Article

Synthesis of Benzothiadiazole Derivatives by Applying C–C Cross-Couplings
The benzothiadiazole moiety has been extensively exploited as a building block in the syntheses of efficient organic semiconducting materials during the past decade. In this paper, parallel synthetic routes to benzothiadiazole derivatives, inspired by previous computational findings, are reported. The results presented here show that various C–C cross-couplings of benzothiadiazole, thiophene, and thiazole derivatives can be efficiently performed by applying Xantphos as a ligand of the catalyst system. Moreover, improved and convenient methods to synthesize important chemical building blocks, e.g., 4,7-dibromo-2,1,3-benzothiadiazole, in good to quantitative yields are presented. Additionally, the feasibility of Suzuki–Miyaura and direct coupling methods are compared in the synthesis of target benzothiadiazole derivatives. The computational characterization of the prepared benzothiadiazole derivatives shows that these compounds have planar molecular backbones and the possibility of intramolecular charge transfer upon excitation. The experimental electrochemical and spectroscopic studies reveal that although the compounds have similar electronic and optical properties in solution, they behave differently in solid state due to the different alkyl side-group substitutions in the molecular backbone. These benzothiadiazole derivatives can be potentially used as building blocks in the construction of more advanced small molecule organic semiconductors with acceptor–donor–acceptor motifs.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Supramolecular photochemistry
Number of pages: 12
Pages: 1535–1546
Publication date: 15 Jan 2016
Peer-reviewed: Yes

Publication information
Journal: Journal of Organic Chemistry
Volume: 81
Issue number: 4
ISSN (Print): 0022-3263
Ratings:
Scopus rating (2016): CiteScore 4.59 SJR 1.976 SNIP 1.03
Scopus rating (2015): SJR 2.018 SNIP 1.174 CiteScore 4.69
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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Research group: Supramolecular photochemistry
Authors: Carraro, G., Maccato, C., Gasparotto, A., Kaunisto, K., Sada, C., Barreca, D.
Number of pages: 10
Pages: 191-200
Publication date: 1 Jan 2016
Peer-reviewed: Yes
Early online date: 1 Jan 2015

Publication information
Journal: Plasma Processes and Polymers
Volume: 13
Issue number: 1
ISSN (Print): 1612-8869
Ratings:
Scopus rating (2016): SJR 0.869 SNIP 1.044 CiteScore 2.69
Scopus rating (2015): SJR 0.912 SNIP 1.315 CiteScore 3.05
Scopus rating (2014): SJR 0.894 SNIP 1.16 CiteScore 2.67
Scopus rating (2013): SJR 1.113 SNIP 1.404 CiteScore 3.39
Scopus rating (2012): SJR 1.222 SNIP 1.205 CiteScore 2.59
Scopus rating (2011): SJR 1.342 SNIP 1.295 CiteScore 2.71
Scopus rating (2010): SJR 0.87 SNIP 0.776
Scopus rating (2009): SJR 0.798 SNIP 0.993
Scopus rating (2008): SJR 0.609 SNIP 0.594
Scopus rating (2007): SJR 0.732 SNIP 1.194
Scopus rating (2006): SJR 0.618 SNIP 1.629
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 with a bimetallic PtPd core and a polycrystalline PdO shell. Also, few, small (~5nm) bimetallic PtPd particles were still detected. In the TA+SW-treated catalyst with grown noble metal particles, 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
Number of pages: 10
Pages: 439-448
Publication date: 2016
Peer-reviewed: Yes
Early online date: 1 Oct 2015

Publication information
Journal: Applied Catalysis B-Environmental
ISSN (Print): 0926-3373
Ratings:
Scopus rating (2016): SJR 2.583 SNIP 2.12 CiteScore 8.86
Scopus rating (2015): SJR 2.26 SNIP 2.081 CiteScore 7.72
Scopus rating (2014): SJR 2.232 SNIP 2.164 CiteScore 6.92
Scopus rating (2013): SJR 2.345 SNIP 2.134 CiteScore 6.42
Scopus rating (2012): SJR 2.629 SNIP 2.236 CiteScore 6.08
Scopus rating (2011): SJR 2.585 SNIP 2.345 CiteScore 6.14
Scopus rating (2010): SJR 2.461 SNIP 1.895
Scopus rating (2009): SJR 2.301 SNIP 2.232
Scopus rating (2008): SJR 2.455 SNIP 2.275
Scopus rating (2007): SJR 2.493 SNIP 2.5
Scopus rating (2006): SJR 2.284 SNIP 2.229
Scopus rating (2005): SJR 2.095 SNIP 2.233
Scopus rating (2004): SJR 2.393 SNIP 2.41
Scopus rating (2003): SJR 1.979 SNIP 2.259
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.

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.
Pages: 153-164
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Fuel
Volume: 176
ISSN (Print): 0016-2361
Ratings:
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
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±3.4m^3 CH_4/t TS) than in the new landfill (VS/TS 21.3±4.3% and BMP 14.4±9.9m^3 CH_4/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 32.9m^3 CH_4/t TS) and 30-70mm (VS/TS 50.8% and BMP 78.5m^3 CH_4/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: Industrial Bioengineering and Applied Organic Chemistry
Authors: Mönkäre, T. J., Palmroth, M. R. T., Rintala, J. A.
Number of pages: 6
Pages: 34-39
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Waste Management
Volume: 47A
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
Effect of biomass combustion on fine particles in boiler super heater area of a large CHP plant

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research area: Optics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Publication date: 2016

Host publication information
Title of host publication: FFRC VIII Liekkipäivä 2016
Links:
http://www.ffrc.fi/Liekkipaiva_2016.html (Conference website)
Research output: Professional › Conference contribution

Effect of source-separated urine storage on estrogenic activity detected using bioluminescent yeast *Saccharomyces cerevisiae*

The objective was to demonstrate that a microbial whole cell biosensor, bioluminescent yeast, *Saccharomyces cerevisiae* (BMAEREluc/ER alpha) can be applied to detect overall estrogenic activity from fresh and stored human urine. The use of source-separated urine in agriculture removes a human originated estrogen source from wastewater influents, subsequently enabling nutrient recycling. Estrogenic activity in urine should be diminished prior to urine usage in agriculture in order to prevent its migration to soil. A storage period of 6 months is required for hygienic reasons; therefore, estrogenic activity monitoring is of interest. The method measured cumulative female hormone-like activity. Calibration curves were prepared for estrone, 17 beta-estradiol, 17 alpha- ethinylestradiol and estriol. Estrogen concentrations of 0.29-29,640 μg L⁻¹ were detectable while limit of detection corresponded to 0.28-35 μg L⁻¹ of estrogens. The yeast sensor responded well to fresh and stored urine and gave high signals corresponding to 0.38-3,804 μg L⁻¹ of estrogens in different urine samples. Estrogenic activity decreased during storage, but was still higher than in fresh urine implying insufficient storage length. The biosensor was suitable for monitoring hormonal activity in urine and can be used in screening anthropogenic estrogen-like compounds interacting with the receptor.

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: Jaatinen, S., Kivistö, A., Palmroth, M., Karp, M.
Pages: 2172-2182
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Environmental Technology
Volume: 37
Issue number: 17
ISSN (Print): 0959-3330
Ratings:
Scopus rating (2016): CiteScore 1.6 SJR 0.528 SNIP 0.747
Scopus rating (2015): SJR 0.633 SNIP 0.772 CiteScore 1.63
Scopus rating (2014): SJR 0.618 SNIP 0.781 CiteScore 1.39
Scopus rating (2013): SJR 0.488 SNIP 0.672 CiteScore 1.3
Scopus rating (2012): SJR 0.645 SNIP 0.877 CiteScore 1.47
Functionality Testing of Water Pressure and Flow Calculation for Dynamic Power Plant Modelling

Water pressure and flow rate calculation in dynamic boiler models is challenging because of stiff system dynamics meaning that time constants of model states vary by several orders of magnitude. Furthermore, strong interconnections between pressures and flow variables may cause instability problems in simulation runs. This study presents a method to implement and test dynamic thermal power plant water-steam system models. A dynamic water-steam system model is presented. The model is applied for testing of the functionality of the presented computation model. Computational performance was tested using different numerical solvers. Also sensitivity to changes in initial values of system states and model parameters was tested. The results indicate that a workable way to make flexible models was found.

Gain-Scheduled Composite Nonlinear Feedback Control of an Exothermic Chemical Reactor

This paper studies gain-scheduled composite nonlinear feedback (CNF) control of a continuous stirred tank reactor (CSTR). Inside the reactor, an exothermic chemical reaction occurs, which is commanded from high to low residual concentration. During the transition, the reaction dynamics change through stable-unstable-stable chain while the residual concentration decreases. Therefore, appropriate cooling is necessary to stabilize the reaction, and to prevent a thermal runaway and overheating of the CSTR. A full-state gain-scheduled CNF controller is designed for adjusting the coolant temperature of the CSTR. A traditional gain-scheduled cascade controller and a gain-scheduled model predictive controller (MPC) are also fabricated for comparison. The simulation results show that the closed-loop system using CNF controller is able to offer the best tracking performance as measured by the integral-of-absolute-error (IAE) criterion. In addition, the CNF controller needs fewer scheduled tuning parameters as opposed to the cascade structure.
High rate autotrophic denitrification in fluidized-bed biofilm reactors

High rate, high efficiency thiosulfate-driven autotrophic denitrification and denitritation 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, denitritation effectively proceeded with the highest nitrite loading rate of 228 mg L⁻¹ h⁻¹. Similar denitrification and denitritation 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.
Measurement of aerosol charge distributions

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research area: Optics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Järvinen, A., Heikkinä, P., Keskinen, J., Yli-Ojanperä, J.
Publication date: 2016

Host publication information
Title of host publication: EAC 2016 : 22nd European Aerosol Conference
Links:
Research output: Professional » Conference contribution

Particle emission from loaders using normal and bio based diesel fuels

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Neste Oil Oyj, VTT Tech Res Ctr Finland, VTT Technical Research Center Finland
Authors: Järvinen, A. R., Wihersaari, H., Karjalainen, P. A., Nuottimäki, J., Kytö, M., Keskinen, J. O., Rönkkö, T. S.
Publication date: 2016
Peer-reviewed: Unknown
Event:
Links:
Research output: Professional » Paper, poster or abstract

Physical characteristics of particles in a large CHP plant boiler during co-combustion of coal and biomass pellets

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Publication date: 2016
Peer-reviewed: Unknown
Event:
Links:
Research output: Scientific » Paper, poster or abstract

Pohjoismaiden energiapolitiikka 2030: Hiilineutraalimpaan energiajärjestelmään osin yhdessä, osin eri polkuja pitkin

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Civil Engineering, Department of Electrical Engineering, Department of Chemistry and Bioengineering, Department of Physics, Research group: Construction Processes, University of Tampere, VTT
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 0.21mgmg⁻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=60.3molkg⁻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.
Real-time investigation of primary particle emissions and secondary particle formation from a gasoline direct injection vehicle

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics
Publication date: 2016
Peer-reviewed: Unknown
Event: Paper presented at European Aerosol Conference, Tours, France.
Research output: Professional › Paper, poster or abstract

Revisiting cellulase production and redefining current strategies based on major challenges Article reference: RSER5103
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.

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: Kuhad, R. C., Deswal, D., Sharma, S., Bhattacharya, A., Kumar Jain, K., Kaur, A., Pletschke, B. I., Singh, A., Karp, M.
Number of pages: 24
Pages: 249-272
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Renewable and Sustainable Energy Reviews
Volume: 55
ISSN (Print): 1364-0321
Ratings:
Scopus rating (2016): SJR 3.051 SNIP 3.454 CiteScore 9.52
Scopus rating (2015): SJR 2.999 SNIP 3.387 CiteScore 8.35
Scopus rating (2014): SJR 3.106 SNIP 3.761 CiteScore 7.79
Structural features determining thermal adaptation of esterases

The adaptation of microorganisms to extreme living temperatures requires the evolution of enzymes with a high catalytic efficiency under these conditions. Such extremophilic enzymes represent valuable tools to study the relationship between protein stability, dynamics and function. Nevertheless, the multiple effects of temperature on the structure and function of enzymes are still poorly understood at the molecular level. Our analysis of four homologous esterases isolated from bacteria living at temperatures ranging from 10 degrees C to 70 degrees C suggested an adaptation route for the modulation of protein thermal properties through the optimization of local flexibility at the protein surface. While the biochemical properties of the recombinant esterases are conserved, their thermal properties have evolved to resemble those of the respective bacterial habitats. Molecular dynamics simulations at temperatures around the optimal temperatures for enzyme catalysis revealed temperature-dependent flexibility of four surface-exposed loops. While the flexibility of some loops increased with raising the temperature and decreased with lowering the temperature, as expected for those loops contributing to the protein stability, other loops showed an increment of flexibility upon lowering and raising the temperature. Preserved flexibility in these regions seems to be important for proper enzyme function. The structural differences of these four loops, distant from the active site, are substantially larger than for the overall protein structure, indicating that amino acid exchanges within these loops occurred more frequently thereby allowing the bacteria to tune atomic interactions for different temperature requirements without interfering with the overall enzyme function.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research area: Computational Physics, Computational Science X (CompX), Heinrich-Heine-University, Düsseldorf
Authors: Kovacic, F., Mandrysch, A., Poojari, C., Strodel, B., Jaeger, K.
Pages: 65-76
Publication date: 2016
Peer-reviewed: Yes
Early online date: 7 Dec 2015

Publication information
Journal: Protein Engineering Design and Selection
Volume: 29
Issue number: 2
ISSN (Print): 1741-0126
Ratings:
Scopus rating (2016): SJR 1.042 SNIP 0.67 CiteScore 2.09
Scopus rating (2015): SJR 1.306 SNIP 0.801 CiteScore 2.46
Scopus rating (2014): SJR 1.348 SNIP 0.855 CiteScore 2.45
Scopus rating (2013): SJR 1.27 SNIP 0.75 CiteScore 2.49
Scopus rating (2012): SJR 1.629 SNIP 0.937 CiteScore 2.83
Scopus rating (2011): SJR 1.392 SNIP 0.825 CiteScore 2.77
Tammikuun tehopiikki – mitä tapahtui 7.1.2016? Miten tehoa hallitaan paremmin jatkossa?

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Department of Civil Engineering, Research group: Life-cycle Economics, Department of Automation Science and Engineering, Research area: Measurement Technology and Process Control, Department of Electrical Engineering, Research area: Power engineering, Research group: Construction Processes, University of Tampere
Pages: 1-15
Publication date: 2016

Publication information
ISBN (Electronic): 978-952-03-0346-4

Publication series
Name: EL-TRAN analyysi
Volume: 7/2016
Links:

Research output: Professional › Discussion paper

Time-resolved characterization of secondary particle formation from a gasoline passenger car

General information
State: Published
Organisations: Department of Physics, Research area: Aerosol Physics
Publication date: 2016
Peer-reviewed: Unknown
Research output: Professional › Paper, poster or abstract

Use of diluted urine for cultivation of Chlorella vulgaris

Our aim was to study the biomass growth of microalg Chlorella vulgaris using diluted human urine as a sole nutrient source. Batch cultivations (21 days) were conducted in five different urine dilutions (1:25-1:300), in 1:100-diluted urine as such and with added trace elements, and as a reference, in artificial growth medium. The highest biomass density was obtained in 1:100-diluted urine with and without additional trace elements (0.73 and 0.60 g L(-1), respectively). Similar biomass growth trends and densities were obtained with 1:25- and 1:300-diluted urine (0.52 vs. 0.48 g VSS L(-1)) indicating that urine at dilution 1:25 can be used to cultivate microagal based biomass. Interestingly, even 1:300-diluted urine contained sufficiently nutrients and trace elements to support biomass growth. Biomass production was similar
despite pH-variation from <5 to 9 in different incubations indicating robustness of the biomass growth. Ammonium formation did not inhibit overall biomass growth. At the beginning of cultivation, the majority of the biomass consisted of living algal cells, while towards the end, their share decreased and the estimated share of bacteria and cell debris increased.

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: Jaatinen, S., Lakaniemi, A., Rintala, J.
Number of pages: 12
Pages: 1159-1170
Publication date: 2016
Peer-reviewed: Yes
Early online date: 7 Nov 2015

Publication information
Journal: Environmental Technology
Volume: 37
Issue number: 9
ISSN (Print): 0959-3330
Ratings:
Scopus rating (2016): CiteScore 1.6 SJR 0.528 SNIP 0.747
Scopus rating (2015): SJR 0.633 SNIP 0.772 CiteScore 1.63
Scopus rating (2014): SJR 0.618 SNIP 0.781 CiteScore 1.39
Scopus rating (2013): SJR 0.488 SNIP 0.672 CiteScore 1.3
Scopus rating (2012): SJR 0.645 SNIP 0.877 CiteScore 1.47
Scopus rating (2011): SJR 0.597 SNIP 0.691 CiteScore 1.35
Scopus rating (2010): SJR 0.491 SNIP 0.473
Scopus rating (2009): SJR 0.395 SNIP 0.422
Scopus rating (2008): SJR 0.422 SNIP 0.581
Scopus rating (2007): SJR 0.419 SNIP 0.596
Scopus rating (2006): SJR 0.475 SNIP 0.556
Scopus rating (2005): SJR 0.505 SNIP 0.689
Scopus rating (2004): SJR 0.676 SNIP 0.649
Scopus rating (2003): SJR 0.538 SNIP 0.641
Scopus rating (2002): SJR 0.673 SNIP 0.734
Scopus rating (2001): SJR 0.586 SNIP 0.904
Scopus rating (2000): SJR 0.606 SNIP 0.788
Scopus rating (1999): SJR 0.631 SNIP 0.768
Original language: English
DOIs:
10.1080/09593330.2015.1105300
Source: PubMed
Source-ID: 26508358
Research output: Scientific - peer-review › Article

Mesophilic anaerobic digestion of pulp and paper industry biosludge-long-term reactor performance and effects of thermal pretreatment
The pulp and paper industry wastewater treatment processes produce large volumes of biosludge. Limited anaerobic degradation of lignocellulose has hindered the utilization of biosludge, but the processing of biosludge using anaerobic digestion has recently regained interest. In this study, biosludge was used as a sole substrate in long-term (400 d) mesophilic laboratory reactor trials. Nine biosludge batches collected evenly over a period of one year from a pulp and paper industry wastewater treatment plant had different solid and nutrient (nitrogen, phosphorus, trace elements) characteristics. Nutrient characteristics may vary by a factor of 2-11, while biomethane potentials (BMPs) ranged from 89 to 102 NL CH₄/kgVS between batches. The BMPs were enhanced by 39-88% with thermal pretreatments at 105-134 °C. Despite varying biosludge properties, stable operation was achieved in reactor trials with a hydraulic retention time (HRT) of 14 d. Hydrolysis was the process limiting step, ceasing gas production when the HRT was shortened to 10 days. However, digestion with an HRT of 10 days was feasible after thermal pretreatment of the biosludge (20 min at 121 °C) due to enhanced hydrolysis. The methane yield was 78 NL CH₄/kgVS for untreated biosludge and was increased by 77% (138 NL CH₄/kgVS) after pretreatment.
Synthesis, crystal structure, physico-chemical characterization and dielectric properties of a new hybrid material, 1-Ethylpiperazine-1,4-diium tetrachlorocadmate
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
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 DSMZ212, Cryptococcus curvatus DSMZ70022, & Cryptococcus albidos 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.
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 °C and temperature range was from 7 to 50 °C at pH 2.5. The particle size (d80) of the ore was 7.6 mm. Surface water taken from lake near the Sokkamo 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 °C acid consumption was highest and lowest at 21 °C, 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 dissolution of cations (Si, Al, Ca, Mg and Mn), the leaching solution pH of 2.0 was recommended for a bioheap application. At pH 2.0, the maximum leaching yields were achieved after 230 days, being 54 % for Ni, 37 % for Zn, 13 % for Cu and 12 % for Co.

Temperature strongly affected the valuable metal yields at pH 2.5. Leaching at low temperature (7 °C) 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 °C, while at other temperatures it slowed down after 100 days. The highest yields were obtained at 21 °C (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 °C 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.

The redox increased during the first two months at 7 °C and reflected the start of ferrous iron oxidation and microbial activity. The concentration of ferric iron was around 400 mg L-1 after two months. After that ferric iron was present all the time at 7 °C and this demonstrated that more ferric iron was available for the oxidation of the mineral sulphide than at other temperatures. The leach liquor redox potential stabilized to 500-600 mV (AgO/AgCl reference) at 7 °C after 40 days and at 21 °C right after beginning, whereas at 35 °C and at 50 °C it varied between 300-500 mV. At 50 °C, all dissolved iron was in ferrous form inspite the variation of redox. After 50 days Fe2+ and Fetot were both 350 mg L-1 indicating that iron oxidation and precipitation occurred at the same time. Brown precipitates accumulated to the surfaces of the agglomerated ore in columns from 7 °C to 50 °C. Additionally, bright yellow precipitates were formed indicating elemental iron oxidation and precipitation occurred at the same time. After 50 days of bioleaching, at 7 °C 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 °C 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 °C 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 108 cells g ore-1.

The microbial community composition and dynamics was by investigated by DNA extraction PCR-DGGE-sequencing
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 °C 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 °C corresponded 99% as A. ferrivorans SS3 (CP002985). One of the 16S rRNA gene sequences of A. ferrooxidans strains at 35 °C corresponded 99% as A. ferridurans ATCC 33022 (NR_117036). At 50 °C, no proper A. ferrooxidans 16S rRNA gene sequences were gained with the used methods. The presence of A. ferrooxidans at 50 °C 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 °C, corresponded also 99% as A. ferrooxidans SS3 (CP002985). In the light of increased knowledge, these species cannot be separated with the denaturing gradient from 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 Sulphobacillus thermotolerans KR-1 (99%, DQ124681) were mainly detected at 21 °C and 35 °C. Sb. thermotolerans was present at 50 °C. L. ferriphilum D1 (99 %, DQ665909) appeared after 300 days of bioleaching and was present in every leach residue, except at 7 °C and pH 3.0. L. ferrooxidans and L. ferriphilum 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 °C. 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 °C.

The mixed iron- and sulphur-oxidizing culture in the recirculation solution at 7 °C was used in the experiments where Fe2+-oxidation rate and optimum temperature were determined over a temperature range of 2-40 °C. Two temperature optima of 22.4 °C and 32.4 °C 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 °C and 32.4 °C, 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 °C. 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 106 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 (99%, NR_028235) were identified again in 2015 using the basic local alignment search tool (BLAST). The 16S rRNA gene sequences of A. ferroxidans at 35 °C corresponded 99% as A. ferridurans ATCC 33022 (NR_117036). At 50 °C, no proper A. ferroxidans 16S rRNA gene sequences were gained with the used methods. The presence of A. ferroxidans at 50 °C was concluded based on the fact that the DGGE band was in the same place as the other A. ferroxidans bands. The 16S rRNA gene sequences of Acidithiobacillus ferrooxidans strains in pH between 1.5 and 3.0, at 21 °C, corresponded also 99% as A. ferrooxidans SS3 (CP002985). In the light of increased knowledge, these species cannot be separated with the denaturing gradient from 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.

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%, DQ503531) 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.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Department of Chemistry and Bioengineering
Authors: Halinen, A.
Number of pages: 71
Publication date: 27 Nov 2015
Heat Transfer Phenomena in Float Glass Heat Treatment Processes

Glass tempering is a process in which the strength of float glass is improved with heat treatment. In a tempering furnace glass is on top of rotating ceramic rollers. In the process glass plates are heated with thermal radiation and forced convection up to about 640˚C and then cooled by air jets at a cooling rate depending on the glass thickness. The residual stress, i.e., tempering level depends on the cooling speed. In order to solve glass temperatures during a tempering process, the problem is to find solving method for radiation heat flux, convection heat transfer coefficients and contact heat transfer coefficient. The aim of the heat-soak process for tempered glass is to eliminate glasses at risk of spontaneous breakage. In the process glasses are heated up to 290˚C by hot air flowing in a channel between them. The problem is to find solving methods for glass and air temperatures which depend on the stream-wise coordinate and time.

A method for solving radiation heat flux from a tubular resistor to a plate under it was developed. The radiative properties of clear and low emissivity coated soda-lime glass were shown and thermal radiation in a plate glass was described. A new method for solving net radiation heat transfer between a clear plate glass and diffuse surroundings was developed. In the method the radiation between glass volume elements is ignored and integration over hemisphere is covered by using the mean reflectivity of glass surface and the mean propagation angle at which radiation travels in glass. The use of the method is limited to glass temperatures below 700˚C. The method was also adapted to coated glass. The method was used to show the effect of the radiation wavelength, glass thickness and low emissivity coating to plate glass radiation properties. The results of the method were compared against results in the literature. The method gave the same results. In the simplest version of the new method only the first internal reflection from glass-air interface was considered, and even then the accuracy was high.

The development of an air jet was introduced with equations. The momentum of the jet was solved experimentally and the results were compared against calculated ones. Local convection heat transfer coefficients on a flat surface under a sonic velocity air jet alike in glass tempering furnace were solved experimentally by using a constant heat flux plate. The effect of discharging pressure, orifice diameter and nozzle-to-plate distance to heat transfer was studied. The literature correlations were used and new experiments were made to research heat transfer under an impinging incompressible jet. It was observed that when the momentum of a jet and nozzle to plate distance are equal, then heat transfer is quite equal, even if the nozzle diameter and discharging pressure varied.

Heat transfer under an array of air jets alike in glass tempering chiller was studied experimentally and with a literature correlation. In the experiment three different jet arrays were used in which only the nozzle diameter varied. The heat transfer of each jet array was found to be quite equal when the fan power needed to create jets was the same. The heat transfer coefficients given by the correlation corresponded well to the ones given by new measurements. Measured heat transfer coefficients were 11 to 14 % higher than the predicted ones, and the change in the overpressure changed the measured heat transfer coefficients in the same relation as it changed the measured ones.

The contact heat transfer between glass and rollers was studied. The following estimate for effective contact heat transfer coefficient of glass on top of ceramic rollers in tempering furnace was found: $1 \leq \frac{1}{3}$ W/(mK).

The methods for solving heat transfer between glass and air flowing in a narrow channel between glasses were presented for both turbulent and laminar flow. The method for solving heat transfer in a heat soak furnace was developed. In the heat soak furnace studied the flow was found to be turbulent, but also laminar flow could occur during the final stages of the heating due to increasing air temperature, i.e., decreasing Reynolds number. Theoretically predicted and measured temperatures were found to be in reasonable agreement. An extended method for furnace designer and operator for solving heat transfer in a heat soak furnace was developed with which was found that in a very narrow channel the heating...
Time increased dramatically because the air temperature at the end of such a channel was almost as low as glass temperature, i.e., heat from the air was already transferred to glass. The heating time also increased with the glass flow-wise length and thickness, although the total mass of the glass loading remained the same.

**General information**

State: Published

Ministry of Education publication type: G4 Doctoral dissertation (monograph)

Organisations: Department of Mechanical Engineering and Industrial Systems

Authors: Rantala, M.

Number of pages: 135

Publication date: 26 Nov 2015

**Publication information**

Publisher: Tampere University of Technology


Original language: English

**Publication series**

Name: Tampere University of Technology. Publication

Publisher: Tampere University of Technology

Volume: 1355

ISSN (Print): 1459-2045

Electronic versions:

rantala_1355

rantala_1355_corrections

Links:


**Bibliographical note**

Awarding institution: Tampere University of Technology

Research output: Monograph › Doctoral Thesis

**Time-resolved characterization of primary and secondary particle emissions of a modern gasoline passenger car**

Changes in traffic systems and vehicle emission reduction technologies significantly affect traffic-related emissions in urban areas. In many densely populated areas the amount of traffic is increasing, keeping the emission level high or even increasing. To understand the health effects of traffic related emissions, both primary and secondary particles that are formed in the atmosphere from gaseous exhaust emissions need to be characterized. In this study we used a comprehensive set of measurements to characterize both primary and secondary particulate emissions of a modern gasoline passenger car. Our aerosol particle study covers the whole process chain in emission formation, from the engine to the atmosphere, and takes into account also differences in driving patterns. We observed that in mass terms, the amount of secondary particles was 13 times higher than the amount of primary particles. The formation, composition, number, and mass of secondary particles was significantly affected by driving patterns and engine conditions. The highest gaseous and particulate emissions were observed at the beginning of the test cycle when the performance of the engine and the catalyst was below optimal. The key parameter for secondary particle formation was the amount of gaseous hydrocarbons in primary emissions; however, also the primary particle population had an influence. Thus, in order to enhance human health and wellbeing in urban areas, our study strongly indicates that in future legislation, special attention should be directed into the reduction of gaseous hydrocarbons.

**General information**

State: Published

Ministry of Education publication type: A1 Journal article-refereed

Organisations: Department of Physics, Research area: Aerosol Physics, Finnish Meteorological Institute, Helsinki, VTT Technical Research Centre of Finland, Pennsylvania State University


Number of pages: 29

Pages: 33253-33282

Publication date: 25 Nov 2015

Peer-reviewed: Yes

**Publication information**

Journal: Atmospheric Chemistry and Physics Discussions

Volume: 15

Issue number: 22
Organic Chromophores in Self-Assembled Monolayers and Supramolecular Arrays

Large aromatic chromophores, e.g. phthalocyanines or perylene derivatives are widely used in modern photonic applications. For these systems, well-organized films of the chromophores are very important. One of the ways to ensure the order on molecular level is to bind the organic dyes covalently to a solid substrate with a suitable anchor group. Expanding the concept, multilayered supramolecular assemblies can be built on surfaces as well.

In the present Thesis various chromophores with a capability to anchor onto a solid surface were prepared. Synthesized molecules were porphyrins, phthalocyanines, and perylene mono- and diimides with different substituents. The anchor-surface pairs were of several types, and the chromophores were attached to a surface by one- or two-step methods.

Two of the perylene monoimide derivatives were found to be a perfect basement for construction of multilayered films. Using a metal-ligand interaction it was possible to prepare stable double layers, as well ten molecules thick stable deeply colored multilayer films. The developed approach is versatile and will allow in future to expand the capabilities of molecular film architecture.

Simultaneous nutrient removal and lipid production with Chlorella vulgaris on sterilized and non-sterilized anaerobically pretreated piggery wastewater

Piggery wastewater is a potent nutrient source for microagal lipid production. Wastewater has been usually sterilized when used for microalgal cultivation. This is uneconomical in large-scale applications. Therefore, lipid productivity of Chlorella vulgaris CYS 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.

Changes in global gene expression of Vibrio parahaemolyticus induced by cold- and heat-stress

Background: Vibrio (V.) parahaemolyticus causes seafood-borne gastro-intestinal bacterial infections in humans worldwide. It is widely found in marine environments and is isolated frequently from seawater, estuarine waters, sediments and raw or insufficiently cooked seafood. Throughout the food chain, V. parahaemolyticus encounters different temperature conditions that might alter metabolism and pathogenicity of the bacterium. In this study, we performed gene expression profiling of V. parahaemolyticus RIMD 2210633 after exposure to 4, 15, 20, 37 and 42°C to describe the cold and heat shock response. Methods: Gene expression profiles of V. parahaemolyticus RIMD 2210633 after exposure to 4, 15, 20, 37 and 42°C were investigated via microarray. Gene expression values and RT-qPCR experiments were compared by plotting the log2 values. Moreover, volcano plots of microarray data were calculated to visualize the distribution of differentially expressed genes at individual temperatures and to assess hybridization qualities and comparability of data. Finally, enriched terms were searched in annotations as well as functional-related gene categories using the Database for Annotation, Visualization and Integrated Discovery. Results: Analysis of 37°C normalised
transcriptomics data resulted in differential expression of 19 genes at 20°C, 193 genes at 4°C, 625 genes at 42°C and 638 genes at 15°C. Thus, the largest number of significantly expressed genes was observed at 15 and 42°C with 13.3 and 13 %, respectively. Genes of many functional categories were highly regulated even at lower temperatures. Virulence associated genes (tdh1, tdh2, toxR, toxS, vopC, T6SS-1, T6SS-2) remained mostly unaffected by heat or cold stress. Conclusion: Along with folding and temperature shock depending systems, an overall temperature-dependent regulation of expression could be shown. Particularly the energy metabolism was affected by changed temperatures. Whole-genome gene expression studies of food related pathogens such as V. parahaemolyticus reveal how these pathogens react to stress impacts to predict its behaviour under conditions like storage and transport.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Department of Signal Processing, Freie Universität Berlin, University of Tampere
Authors: Urmersbach, S., Aho, T., Alter, T., Hassan, S. S., Autio, R., Huehn, S.
Publication date: 23 Oct 2015
Peer-reviewed: Yes

Publication information
Journal: BMC Microbiology
Volume: 15
Issue number: 1
Article number: 229
ISSN (Print): 1471-2180
Ratings:
Scopus rating (2016): SJR 1.23 SNIP 0.992 CiteScore 2.82
Scopus rating (2015): SJR 1.401 SNIP 0.998 CiteScore 2.93
Scopus rating (2014): SJR 1.472 SNIP 1.039 CiteScore 2.95
Scopus rating (2013): SJR 1.527 SNIP 1.143 CiteScore 3.32
Scopus rating (2012): SJR 1.454 SNIP 1.12 CiteScore 3.38
Scopus rating (2011): SJR 1.472 SNIP 1.116 CiteScore 3.4
Scopus rating (2010): SJR 1.405 SNIP 1.03
Scopus rating (2009): SJR 1.438 SNIP 0.964
Scopus rating (2008): SJR 1.432 SNIP 0.99
Scopus rating (2007): SJR 1.354 SNIP 0.949
Scopus rating (2006): SJR 1.261 SNIP 0.827
Scopus rating (2005): SJR 0.734 SNIP 0.548
Scopus rating (2004): SJR 0.668 SNIP 0.544
Scopus rating (2003): SJR 0.661 SNIP 0.535
Scopus rating (2002): SJR 0.69 SNIP 0.511
Original language: English
Keywords: Gene expression, Thermal shock, Vibrio parahaemolyticus
ASJC Scopus subject areas: Microbiology, Microbiology (medical)
DOIs:
10.1186/s12866-015-0565-7
Links:
http://www.scopus.com/inward/record.url?scp=84944883751&partnerID=8YFLogxK (Link to publication in Scopus)

Bibliographical note
ORG=keb,0.5
ORG=sgn,0.5
Source: Scopus
Source-ID: 84944883751
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
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), Community-Led Accelerated WASH (COWASH) Project
Authors: Behailu, B. M., Suominen, A., Katko, T. S.
Number of pages: 22
Pages: 379-400
Publication date: 22 Oct 2015
Peer-reviewed: Yes
Early online date: 13 Jul 2015

Publication information
Journal: Public Works Management and Policy
Volume: 20
Issue number: 4
ISSN (Print): 1087-724X
Ratings:
Scopus rating (2016): CiteScore 0.35 SJR 0.171 SNIP 0.481
Scopus rating (2015): SJR 0.243 SNIP 0.423 CiteScore 0.38
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
Scopus rating (2001): SJR 0.195 SNIP 0.332
Scopus rating (2000): SJR 0.237 SNIP 0.545
Scopus rating (1999): SJR 0.127 SNIP 0.112
Original language: English
ASJC Scopus subject areas: Business, Management and Accounting (miscellaneous), Sociology and Political Science, Public Administration
Keywords: community-managed projects (CMP), Ethiopia, evolution, sustainability, water sector reforms
DOI:
10.1177/1087724X15593955
Source: Scopus
Source-ID: 84942086997
Research output: Scientific - peer-review > Article

Regenerative Astaxanthin Extraction from a Single Microalgal (Haematococcus pluvialis) Cell Using a Gold Nano-Scalpel
Milking of microalgae, the process of reusing the biomass for continuous production of target compounds, can strikingly overcome the time and cost constraints associated with biorefinery. This process can significantly improve production efficiency of highly valuable chemicals, for example, astaxanthin (AXT) from Haematococcus pluvialis. Detailed understanding of the biological process of cell survival and AXT reaccumulation after extraction would be of great help for successful milking. Here we report extraction of AXT from a single cell of H. pluvialis through incision of the cell wall by a gold nanoscalpel (Au-NS), which allows single-cell analysis of wound healing and reaccumulation of AXT. Interestingly, upon the Au-NS incision, the cell could reaccumulate AXT at a rate two times faster than the control cells. Efficient extraction as well as minimal cellular damage, keeping cells alive, could be achieved with the optimized shape and dimensions of Au-NS: a well-defined sharp tip, thickness under 300 nm, and 1-3 μm of width. The demonstration of regenerative extraction of AXT at a single cell level hints toward the potential of a milking process for continuous recovery of target compounds from microalgae while keeping the cells alive.
The Effect of Phosphorus Exposure on Diesel Oxidation Catalysts-Part II: Characterization of Structural Changes by Transmission Electron Microscopy

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 aluminium 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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Research group: Materials Characterization, Univ Oulu, University of Oulu, Fac Technol Mass & Heat Transfer Proc Engn, Aalto University, Dinex Ecocat Oy
Authors: Honkanen, M., Kärkkäinen, M., Heikkinen, O., Kallinen, K., Kolli, T., Huuhtanen, M., Lahtinen, J., Keiski, R. L., Lepistö, T., Vippola, M.
Number of pages: 6
Pages: 971-976
Publication date: Oct 2015
Peer-reviewed: Yes

Publication information
Journal: Topics in Catalysis
Volume: 58
Atmospheric dilution and dispersion of particles and SO2 emitted by a coal fired power plant

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Finnish Meteorological Institute, Metropolia University of Applied Sciences, Helen Oy
Publication date: Sep 2015

Host publication information
Title of host publication: European Aerosol Conference

Bibliographical note
xabstract
Research output: Professional › Conference contribution

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.

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, Urban circular bioeconomy (UrCirBio)
Number of pages: 8
Pages: 369-376
Publication date: Sep 2015
Peer-reviewed: Yes

Publication information
Journal: Bioresource Technology
Volume: 191
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: Lipid production, Chlorella vulgaris, Piggery wastewater
DOIs:
10.1016/j.biortech.2015.02.075
Links:
Source: RIS
Source-ID: urn:99005CD93E391712ED9AA9AF768F175C
Research output: Scientific - peer-review › Article

Kaupunkikouluvarsin terveydsriskit otettava huomioon

General information
State: Published
Ministry of Education publication type: E1 Popularised article, newspaper article
Organisations: Department of Physics, Research area: Aerosol Physics
Authors: Saari, S., Rönkkö, T.
Publication date: 21 Aug 2015
Peer-reviewed: Unknown

Publication information
Journal: Suomen Kuvalehti
Volume: 34/2015
Original language: Finnish
Links:
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/cm<sup>2</sup> 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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Portland State University, Department of Civil and Environmental Engineering, Yildiz Technical University
Authors: Çetinkaya, A. Y., Köroğlu, E. O., Demir, N. M., Baysoy, D. Y., Özkaya, B., Çakmakçi, M.
Number of pages: 9
Pages: 1068-1076
Publication date: 20 Jul 2015
Peer-reviewed: Yes

Publication information
Journal: Chinese Journal of Catalysis
Volume: 36
Issue number: 7
ISSN (Print): 0253-9837
Ratings:
Scopus rating (2016): SJR 0.7 SNIP 0.812 CiteScore 2.56
Scopus rating (2015): SJR 0.585 SNIP 0.809 CiteScore 2.24
Scopus rating (2014): SJR 0.514 SNIP 0.735 CiteScore 1.6
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
Scopus rating (2004): SJR 0.245 SNIP 0.395
Scopus rating (2003): SJR 0.166 SNIP 0.287
Scopus rating (2002): SJR 0.157 SNIP 0.276
Scopus rating (2001): SJR 0.139 SNIP 0.131
Scopus rating (2000): SJR 0.117 SNIP 0.135
Scopus rating (1999): SJR 0.134 SNIP 0.203
Original language: English
ASJC Scopus subject areas: Catalysis, Chemistry(all)
Keywords: Anaerobic processe, Biofilm, Microbial community, Microbial fuel cell, Wastewater treatment
DOI: 10.1016/S1872-2067(15)60833-6
Links:
http://www.scopus.com/inward/record.url?scp=84934932934&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
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.

Lipid production by eukaryotic microorganisms isolated from palm oil mill effluent

Microbial oil production combined with wastewater management is one option for a more sustainable future. Micrographs of microbial cultures enriched from palm oil mill effluent (POME) showed lipid inclusion in the eukaryotic cells, indicating the cells can accumulate lipids. However, enriching the culture did not increase the total lipids. Therefore, eukaryotic microorganisms were isolated from POME to investigate whether these microorganisms are potential lipid producers. Four strains were isolated, and their lipid synthesis capabilities were compared with known oleaginous yeasts in a synthetic oil-free medium. Two strains (identified as Galactomyces geotrichum and Graphium penicillioides) had the potential to accumulate lipid accumulation based on the increase in triacylglycerol content. G. penicillioides was the most promising
strain for lipid production as this strain accumulated more lipids than the well-known oleaginous yeast Cryptococcus curvatus (29.1 ± 3.0. wt% vs. 20.2 ± 2.9. wt%). To our knowledge, oil synthesis and accumulation by G. penicillioides have not previously been reported.

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, Urban circular bioeconomy (UrCirBio), National Cheng Kung University, Center of Bioscience and Biotechnology, Research Center for Energy Technology and Strategy, Neste Oil Oyj
Authors: Marjakangas, J. M., Lakaniemi, A. M., Koskinen, P. E. P., Chang, J. S., Puhakka, J. A.
Number of pages: 7
Pages: 48-54
Publication date: 5 Jul 2015
Peer-reviewed: Yes

Publication information
Journal: Biochemical Engineering Journal
Volume: 99
ISSN (Print): 1369-703X
Ratings:
Scopus rating (2016): SJR 0.893 SNIP 1.181 CiteScore 3.16
Scopus rating (2015): SJR 0.955 SNIP 1.063 CiteScore 2.75
Scopus rating (2014): SJR 1.059 SNIP 1.226 CiteScore 2.72
Scopus rating (2013): SJR 1.068 SNIP 1.326 CiteScore 3.03
Scopus rating (2012): SJR 1.218 SNIP 1.727 CiteScore 3.15
Scopus rating (2011): SJR 1.21 SNIP 1.347 CiteScore 2.95
Scopus rating (2010): SJR 1.248 SNIP 1.452
Scopus rating (2009): SJR 1.048 SNIP 1.253
Scopus rating (2008): SJR 1.014 SNIP 1.269
Scopus rating (2007): SJR 0.894 SNIP 1.223
Scopus rating (2006): SJR 0.816 SNIP 1.342
Scopus rating (2005): SJR 0.673 SNIP 1.258
Scopus rating (2004): SJR 0.762 SNIP 1.214
Scopus rating (2003): SJR 0.486 SNIP 1.069
Scopus rating (2002): SJR 0.549 SNIP 0.88
Scopus rating (2001): SJR 0.346 SNIP 0.873
Scopus rating (2000): SJR 0.3 SNIP 0.83
Scopus rating (1999): SJR 0.316 SNIP 0.684
Original language: English
ASJC Scopus subject areas: Biotechnology, Bioengineering, Biomedical Engineering, Environmental Engineering
Keywords: Filamentous fungi, Lipid accumulation, Microbial growth, Palm oil mill effluent, Physiology, Yeast
DOIs:
10.1016/j.bej.2015.03.006
Links:
http://www.scopus.com/inward/record.url?scp=84924943977&partnerID=8YFlgroXK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84924943977
Research output: Scientific - peer-review › Article

A comparison of rheology and FTIR in the study of polypropylene and polystyrene photodegradation
Rheology and FTIR spectroscopy are compared as methods to study the degree of photodegradation in polypropylene (PP) and polystyrene (PS) sheets. The materials are hot pressed, artificially photo-aged with fluorescent lights for 4-2048 h and then measured with a rotational rheometer and FTIR. Both materials show a tendency for chain scission which can be seen as a reduction in viscosity. Changes in PP can be observed with both methods after 256 h of irradiation. Changes in PS become significant in rheology after 64 h but in FTIR only after 1024 h of irradiation. Due to the different chemical nature of the materials, the degradation of PS is rather linear with exposure, whereas the degradation of PP is more exponential. Using the zero shear viscosities obtained through extrapolations of the Cole-Cole and Carreau-Yasuda models, relative molecular weights are estimated with the aid of the power-law relationship between these two. These results are compared with the carbonyl indices determined from the FTIR spectra. Rheology is found to be a viable alternative for FTIR in certain situations.
Portable Emission Measurement System (PEMS) for Exhaust Aerosols

General information
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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio), Abo Akademi University, Åbo Akademi University, University of Jyväskylä, Process Chemistry Center, VTT Technical Research Centre of Finland
Authors: Perander, M., DeMartini, N., Brink, A., Kramb, J., Karlström, O., Hemming, J., Moilanen, A., Konttinen, J., Hupa, M.
Number of pages: 9
Pages: 464-472
Publication date: 15 Jun 2015
Peer-reviewed: Yes

Publication information
Journal: Fuel
Volume: 150
ISSN (Print): 0016-2361
Ratings:
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
Portable emission measurement system (PEMS) for tailpipe and exhaust plume aerosols

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Publication date: 15 Jun 2015

Host publication information
Title of host publication: Aerosol Technology 2015
Article number: O086
Keywords: vehicle emissions, emission measurement
Links:

Bibliographical note
xabstract
Research output: Scientific - peer-review » Conference contribution

Systematic search for design contradictions in systems' architecture: Toward a computer aided analysis

Time pressure imposed to the engineering design process is one fundamental constraint pushing engineers to rush into known solutions, to avoid analysing properly the environment of a design problem, to avoid modelling design problems and to take decision based on isolated evidences. Early phases in particular have to be kept short despite the large impact of decisions taken at this stage. Significant efforts are currently spent within different engineering communities to develop a model-based design approach adapted to conceptual stages. Developing such type of models is also challenging due to the fuzziness of the information and due to the complexity of the concepts and processes manipulated at this stage. Currently few support tools are really capable of really supporting an analysis of the early design concepts and architectures. Simultaneously the approach should be fast, easy to use and should provide a real added-value to efficiently support the decision and the design process. The present article is presenting a framework based on a progressive transformation of the design concepts. The final material generated by this transformation process is an oriented graph with different types of classified variables. This graph can be processed as described in the article to automatically exhibit the conflicts or contradictions present in the design concept architecture. The article is proposing two main contributions which are a real move toward model development at conceptual stage and the possibility to process those models to detect solution weaknesses. The discussion is presenting further developments and possibilities associated with this method.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mechanical Engineering and Industrial Systems, Research area: Manufacturing and Automation, Department of Pervasive Computing, Research area: Software engineering, Intelligent dexterity for secure networked infrastructure and applications (IDSNIA), Aalto University, Department of Mechanical Engineering and Integrated Systems, Applied Physics Laboratory, Johns Hopkins University, Karlsruhe University
Authors: Coatanéa, E., Nonsiri, S., Roca, R., Mokammel, F., Kruck, J., Christophe, F.
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.

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Chemistry and Bioengineering, The Education Fund
Authors: Takala, A., Korhonen-Yrjänheikki, K.
Optimal Shapes of Straight Fins and Finned Heat Sinks

Finned heat sinks are used to cool power electronics components. We present optimization results for single rectangular, triangular, and trapezoidal fins. After that, we minimize the mass of an existing heat sink consisting of a base plate and a fin array by optimizing the geometrical variables and component locations on the base plate. An analytical solution is used with rectangular fins and a numerical model with trapezoidal fins. Whereas the triangle is the best shape for single fins, in a heat sink flow velocity coupled with geometry favors trapezoids over triangles and rectangles.
Selenium biomineralization for biotechnological applications

Selenium (Se) is not only a strategic element in high-tech electronics and an essential trace element in living organisms, but also a potential toxin with low threshold concentrations. Environmental biotechnological applications using bacterial biomineralization have the potential not only to remove selenium from contaminated waters, but also to sequester it in a reusable form. Selenium biomineralization has been observed in phylogenetically diverse microorganisms isolated from pristine and contaminated environments, yet it is one of the most poorly understood biogeochemical processes. Microbial respiration of selenium is unique because the microbial cells are presented with both soluble (SeO₄²⁻ and SeO₃²⁻) and insoluble (Se) forms of selenium as terminal electron acceptor. Here, we highlight selenium biomineralization and the potential biotechnological uses for it in bioremediation and wastewater treatment.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Authors: Nancharaiah, Y. V., Lens, P. N. L.
Number of pages: 8
Pages: 323-330
Publication date: Jun 2015
Peer-reviewed: Yes

Publication information
Journal: Trends in Biotechnology
Volume: 33
Issue number: 6
ISSN (Print): 0167-7799

Ratings:
Scopus rating (2016): SJR 4.037 SNIP 3.143 CiteScore 9.97
Scopus rating (2015): SJR 4.091 SNIP 3.391 CiteScore 9.72
Scopus rating (2014): SJR 4.344 SNIP 3.35 CiteScore 10.31
Scopus rating (2013): SJR 3.763 SNIP 3.151 CiteScore 10.5
Scopus rating (2012): SJR 3.353 SNIP 3.083 CiteScore 9.77
Scopus rating (2011): SJR 3.321 SNIP 3.05 CiteScore 9.82
Scopus rating (2010): SJR 3.062 SNIP 2.734
Scopus rating (2009): SJR 2.751 SNIP 2.682
Scopus rating (2008): SJR 2.509 SNIP 2.185
Scopus rating (2007): SJR 2.361 SNIP 2.393
Scopus rating (2006): SJR 2.149 SNIP 2.196
Scopus rating (2005): SJR 1.911 SNIP 2.109
Scopus rating (2004): SJR 1.797 SNIP 1.762
Scopus rating (2003): SJR 1.552 SNIP 2.063
Scopus rating (2002): SJR 1.633 SNIP 1.893
Scopus rating (2001): SJR 2.031 SNIP 2.292
Scopus rating (2000): SJR 2.124 SNIP 2.209
Scopus rating (1999): SJR 2.044 SNIP 2.016

Original language: English
Keywords: biomineralization, selenium bioreduction, selenium deficiency, selenium supplementation, selenium nanomaterials, wastewater treatment, ELEMENTAL SELENIUM, WASTE-WATER, RESPIRING BACTERIA, SELENATE REDUCTION, THAUERA-SELENATIS, BIOFILM REACTOR, HUMAN HEALTH, NANOPARTICLES, REMOVAL, SLUDGE

DOIs:
10.1016/j.tibtech.2015.03.004

Source: WOS
Source-ID: 000355709700003

Research output: Scientific - peer-review › Literature review
Reframing the value of virtual prototyping: Intermediary virtual prototyping - the evolving approach of virtual environments based virtual prototyping in the context of new product development and low volume production

This thesis studies how the evolving approach of virtual environments-based virtual prototyping can be evaluated in the context of product design and development in the manufacturing industry. The entry point for this research is the relatively long experience in applied research in virtual prototyping with industry. As the virtual prototyping technology has become more mature, the focus of research and development has extended from technology demonstrations towards utilization in product design and development processes. However, lack of scientific and practical knowledge of real benefits and the value of virtual prototyping has seemed to be a deterrent to its wider adoption of industry. The aim of this thesis is by means of scientific research to increase the knowledge of the value contribution of virtual prototyping as well as its impacts in a practical industrial context.

This problem was approached from the science base by formulating an expanded theory framework for value modelling, and from the problem base by an empirical case study in one manufacturing company. The research approach was constructive and exploratory.

The research results consist of three types of knowledge. Firstly, the scientific theoretical foundation was elaborated for initiating value modelling of virtual prototyping and virtual environments. Secondly, new knowledge on the value of virtual prototyping within new product development was created in an industrial case study. Finally, knowledge on how virtual prototyping (VP) impacts the company was reported. The impact was discussed in the dimensions of process, social and technological implications.

This research contributed to engineering design science by conceptualizing virtual prototyping in the context of product design and development expanding to the dimensions of human factors and management theory. Thus, the contribution is also manifested by constructing the expanded theory framework for virtual prototyping value modelling in four dimensions with causal justification from virtual reality technology to business value elements which led to the new concept of Intermediary Virtual Prototyping (IVP). The discussed concept of IVP underscores the many layers from technical advantages of virtual reality to the expanded mediating object of product development activity system.

The discussion was carried on from the perspective of a partially configurable products and manual work-intensive variant production mode. This perspective is novel compared to the majority of virtual prototyping and virtual environments literature. It is proposed that IVP is particularly beneficial in this context, where human skills and knowledge contribute to the flexibility of production system.

IVP should be considered as a strategic investment that will produce income in the long run. IVP contributes to the co-creation and variant production paradigms by involving human creativity at an early product design and development phase, thus increasing flexibility. IVP creates value in use, but in turn it impacts the company in all the four dimensions mentioned.

General information
State: Published
Ministry of Education publication type: G4 Doctoral dissertation (monograph)
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Leino, S.
Number of pages: 312
Publication date: 22 May 2015

Publication information
Publisher: VTT
ISBN (Electronic): 978-951-38-8291-4
Original language: English

Publication series
Name: VTT Science
Publisher: VTT
Volume: 89
ISSN (Print): 2242-119X
ISSN (Electronic): 2242-1203
Electronic versions:
leino_s89
Links:
http://urn.fi/URN:NBN:fi tty-201609134500
CFD modeling of a vehicle exhaust laboratory sampling system: Sulfur-driven nucleation and growth in diluting diesel exhaust

A new exhaust aerosol model CFD-TUTEAM (Tampere University of Technology Exhaust Aerosol Model for Computational Fluid Dynamics) was developed. It is based on modal aerosol dynamics modeling with log-normal assumption of particle distributions. The model has an Eulerian sub-model providing detailed spatial information within the computational domain and a computationally less expensive, but spatial-information-lacking, Lagrangian sub-model.

Particle formation in a laboratory sampling system that includes a porous tube-type diluter and an aging chamber was modeled with CFD-TUTEAM. The simulation results imply that over 99% of new particles are formed in the aging chamber region because the nucleation rate remains at a high level in the aging chamber due to low dilution ratio and low nucleation exponents. The nucleation exponents for sulfuric acid in sulfuric-acid-water nucleation ranging from 0.25 to 1 appeared to fit best with measurement data, which are the same values as obtained from the slopes of the measured volatile nucleation mode number concentration vs. the measured raw exhaust sulfuric acid concentration. These nucleation exponents are very low compared to the nucleation exponents obtained from the classical nucleation theory of binary sulfuric-acid-water nucleation. The values of nucleation exponent lower than unity suggest that other compounds, such as hydrocarbons, might have a significant role in the nucleation process.
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.
On the choice of damage variable in the continuum fatigue model based on a moving endurance surface

This paper considers two different damage formulations for modelling high-cycle fatigue of materials. The underlying fatigue model is formulated within continuum mechanics framework with the concept of a moving endurance surface. Such a model has a unique feature that it allows for the concepts of fatigue limits and damage accumulation during the load history thus avoiding cycle-counting techniques. A Scalar and tensor type of damage variables are utilized with an essentially similar type of damage evolution law. The tensor damage model capable of accounting for damage induced anisotropy is based on the gradient of the endurance surface. The performance of the scalar and tensor damage formulations are compared with different multidimensional stress histories.

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.
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 cellulytic 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 mmol 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 mmol 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 cellulytic organisms. Most differences among the samples were attributed to small taxonomic groups represented by ≤10% of total sequences.
On improvement of transient stage of composite nonlinear feedback control using arbitrary order set point filters

This paper studies the generalization of composite nonlinear feedback (CNF) control using arbitrary order set point filters, which focus on the initial stage of the transient response. The set point filters can be used to provide more performance by shortening the rise and settling times of the control system. Furthermore, the filters operate outside the feedback loop, and hence, they do not sacrifice loop robustness. The new method is illustrated by a benchmark problem found in an open literature. The simulation results show that the proposed method improves the set point response more than 10% in terms of settling time.

Composite Nonlinear Feedback Control of a Chemical Reactor

This paper studies the application of composite nonlinear feedback (CNF) control for a continuous time stirred tank reactor. Inside the reactor, an exothermic chemical reaction occurs, which requires cooling when concentration is commanded from low to high conversion rate to prevent a thermal runaway. A full-state CNF controller is designed for adjusting the temperature of the cooling jacket using concentration and temperature measurements. A continuous time gain-scheduled cascade controller, as well as a model predictive controller (MPC) is also fabricated for comparison. The gain-scheduled cascade controller has a proportional-integral (PI) controller as a primary loop controller, and a P-controller as a secondary loop controller. The simulation results show that the CNF controller is able to offer the best overall tracking performance as measured by the integral-of-absolute-error (IAE) criterion. In addition, the CNF controller does not need gain-scheduling for tuning purposes; the CNF controller is capable of changing its tuning as a function of control error only.
Copper Production as an Application of Optimization and Scheduling

Copper production in a copper smelter is a process comprised of batch and continuous production tasks. Typically, subprocesses have been operated in a locally optimal way though significant interdependencies exist. In general, copper production presents a harsh environment where production is often disturbed by unforeseen events and frequent maintenance operations. Optimization of production is further complicated by the significantly differing timescales with recycling of some materials. This work presents first the main production tasks related to copper production and then details requirements and procedures in modelling the full task with the goal of producing models suitable for a global scheduling solution. The main scheduling decision variables are detailed and a simplified example of scheduling two converters is included. The scheduling and optimization is to provide operators with advice on timings and resource use to maximize equipment use and production throughput. The solution structure may be viewed as a combination of scheduling and predictive control techniques. By considering material inputs over the complete production cycle, the optimization is to provide improvements especially in impurity control.

General information

State: Published
Ministry of Education publication type: A4 Article in a conference publication
Authors: Suominen, O., Björkqvist, K., Vilkko, M., Korpi, M.
Number of pages: 6
Pages: 1-6
Publication date: 17 Mar 2015

Host publication information

Title of host publication: Automaatio XXI seminaari 2015
Place of publication: Helsinki
Publisher: Suomen Automaatioseura ry
Editor: Jämsä-Jounela, S.
ISBN (Print): 978-952-5183-46-7

Publication series

Name: SAS julkaisusarja
Publisher: Finnish Society of Automation
No.: 44
ISSN (Print): 1455-6502
ISSN (Electronic): 1455-6502
Keywords: copper smelter, modelling, scheduling, optimization
Links:
http://xxi.automaatioseura.fi/ (conference home page)
Research output: Scientific - peer-review › Conference contribution

Effects of fresh lubricant oils on particle emissions emitted by a modern gasoline direct injection passenger car

Particle emissions from a modern turbocharged gasoline direct injection passenger car equipped with a three-way catalyst and an exhaust gas recirculation system were studied while the vehicle was running on low-sulfur gasoline and, consecutively, with five different lubrication oils. Exhaust particle number concentration, size distribution, and volatility were determined both at laboratory and on-road conditions. The results indicated that the choice of lubricant affected particle emissions both during the cold start and warm driving cycles. However, the contribution of engine oil depended on driving conditions being higher during acceleration and steady state driving than during deceleration. The highest emission factors were found with two oils that had the highest metal content. The results indicate that a 10% decrease in the Zn content of engine oils is linked with an 11-13% decrease to the nonvolatile particle number emissions in steady driving conditions and a 5% decrease over the New European Driving Cycle. The effect of lubricant on volatile particles was even higher, on the order of 20%.

General information
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.

General information
State: Published
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry, Urban circular bioeconomy (UrCirBio), Université Paris-Est, Laboratoire Géomatériaux et Environnement (EA 4508), UPEM
Authors: Zou, G., Papirio, S., van Hullebusch, E. D., Puhakka, J. A.
Number of pages: 7
Pages: 284-290
Publication date: 1 Mar 2015
Peer-reviewed: Yes
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 1.41mol-H₂/mol-glycerol consumed at concentrations 4.40g/L and 2.27g/L for NH₄Cl and KH₂PO₄ respectively. Confirmation experiment with the optimized media (NH₄Cl, 4.40g/L; K₂HPO₄, 1.6g/L; KH₂PO₄, 2.27g/L; MgCl₂·6H₂O, 1.0g/L; KCl, 1.0g/L; Na-acetate, 3H₂O, 1.0g/L and tryptone, 2.0g/L) revealed an excellent correlation between predicted and experimental hydrogen yield. Optimization of media components by design of experiments enhanced hydrogen yield by 29%.

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, Tampere University of Technology, Department of Signal Processing, Urban circular bioeconomy (UrCirBio)
Authors: Mangayil, R., Aho, T., Karp, M., Santala, V.
Number of pages: 7
Pages: 583-589
Publication date: 1 Mar 2015
Peer-reviewed: Yes

Publication information
Journal: Renewable Energy
Volume: 75
ISSN (Print): 0960-1481
Ratings:
Scopus rating (2016): CiteScore 4.83 SJR 1.697 SNIP 2.044
Scopus rating (2015): SJR 1.845 SNIP 2.118 CiteScore 4.51
Scopus rating (2014): SJR 1.983 SNIP 2.687 CiteScore 4.51
Scopus rating (2013): SJR 2.066 SNIP 2.767 CiteScore 4.63
Scopus rating (2012): SJR 1.852 SNIP 2.745 CiteScore 3.97
Scopus rating (2011): SJR 1.688 SNIP 2.404 CiteScore 3.9
Scopus rating (2010): SJR 1.494 SNIP 2.215
Scopus rating (2009): SJR 1.305 SNIP 1.945
Scopus rating (2008): SJR 1.449 SNIP 1.867
Scopus rating (2007): SJR 1.214 SNIP 1.65
Scopus rating (2006): SJR 1.137 SNIP 1.486
Scopus rating (2005): SJR 1.215 SNIP 1.26
Scopus rating (2004): SJR 0.76 SNIP 1.154
Scopus rating (2003): SJR 0.965 SNIP 0.948
Scopus rating (2002): SJR 0.473 SNIP 0.539
Scopus rating (2001): SJR 0.554 SNIP 0.449
Scopus rating (2000): SJR 0.466 SNIP 0.697
Scopus rating (1999): SJR 0.264 SNIP 0.627

Original language: English
ASJC Scopus subject areas: Renewable Energy, Sustainability and the Environment
Keywords: Biohydrogen, Crude glycerol, Optimization, Response surface methodology
DOI:
10.1016/j.renene.2014.10.051
Links:
http://www.scopus.com/inward/record.url?scp=84910051633&partnerID=8YFLogxK (Link to publication in Scopus)

Bibliographical note
Available online 3 November 2014 : Volume 75, March 2015, Pages 583-589<br/>Contribution:
organisation=keb,FAC T1=1<br/>Portfolio EDEND: 2014-12-12<br/>Publisher name: Pergamon; The World Renewable Energy Network
Source: researchoutputwizard
Source-ID: 1020
Research output: Scientific - peer-review › Article

A Method and an Apparatus for Producing Nanocellulose

General information
State: Published
Ministry of Education publication type: H1 Granted patent
Authors: Björkqvist, T., Koskinen, T., Nuopponen, M., Vehniäinen, A., Gustafsson, H.
Publication date: 18 Feb 2015

Publication information
IPC: D21H 11/ 18 A I
Patent number: EP2659061
Priority date: 31/12/10
Priority number: FI 20106402
Original language: English
Source: espacenet
Source-ID: EP2659061
Research output: Scientific › Patent

Proton-coupled electron transfer and the role of water molecules in proton pumping by cytochrome c oxidase
Molecular oxygen acts as the terminal electron sink in the respiratory chains of aerobic organisms. Cytochrome c oxidase in the inner membrane of mitochondria and the plasma membrane of bacteria catalyzes the reduction of oxygen to water, and couples the free energy of the reaction to proton pumping across the membrane. The proton-pumping activity contributes to the proton electrochemical gradient, which drives the synthesis of ATP. Based on kinetic experiments on the O-O bond splitting transition of the catalytic cycle (A → PR), it has been proposed that the electron transfer to the binuclear iron-copper center of O2 reduction initiates the proton pump mechanism. This key electron transfer event is coupled to an
internal proton transfer from a conserved glutamic acid to the proton-loading site of the pump. However, the proton may
instead be transferred to the binuclear center to complete the oxygen reduction chemistry, which would constitute a short-
circuit. Based on atomistic molecular dynamics simulations of cytochrome c oxidase in an explicit membrane-solvent
environment, complemented by related free-energy calculations, we propose that this short-circuit is effectively prevented
by a redoxstate-dependent organization of water molecules within the protein structure that gates the proton transfer
pathway.

**General information**

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Physics, Research group: Biological Physics and Soft Matter, Computational Science X
(CompX), University of Southern Denmark, Programme for Structural Biology and Biophysics, University of Helsinki
Institute of Biototechnology
Authors: Sharma, V., Enkavi, G., Vattulainen, I., Róg, T., Wikström, M.
Number of pages: 6
Pages: 2040-2045
Publication date: 17 Feb 2015
Peer-reviewed: Yes

**Publication information**

Journal: Proceedings of the National Academy of Sciences of the United States of America
Volume: 112
Issue number: 7
ISSN (Print): 0027-8424
Ratings:
Scopus rating (2016): CiteScore 8.56 SJR 6.321 SNIP 2.629
Scopus rating (2015): SJR 6.767 SNIP 2.682 CiteScore 8.84
Scopus rating (2014): SJR 6.853 SNIP 2.725 CiteScore 8.86
Scopus rating (2013): SJR 6.989 SNIP 2.73 CiteScore 9.5
Scopus rating (2012): SJR 6.792 SNIP 2.682 CiteScore 9.49
Scopus rating (2011): SJR 6.771 SNIP 2.636 CiteScore 9.31
Scopus rating (2010): SJR 6.769 SNIP 2.529
Scopus rating (2009): SJR 6.913 SNIP 2.544
Scopus rating (2008): SJR 6.899 SNIP 2.445
Scopus rating (2007): SJR 6.766 SNIP 2.441
Scopus rating (2006): SJR 6.734 SNIP 2.434
Scopus rating (2005): SJR 6.784 SNIP 2.551
Scopus rating (2004): SJR 7.026 SNIP 2.622
Scopus rating (2003): SJR 7.018 SNIP 2.501
Scopus rating (2002): SJR 7.183 SNIP 2.471
Scopus rating (2001): SJR 7.192 SNIP 2.463
Scopus rating (2000): SJR 7.731 SNIP 2.475
Scopus rating (1999): SJR 8.271 SNIP 2.446
Original language: English
ASJC Scopus subject areas: General
DOI:
10.1073/pnas.1409543112
Links:
http://www.scopus.com/inward/record.url?scp=84923209928&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84923209928
Research output: Scientific - peer-review › Article

**High speed, high strength microwelding of Si/glass using ps-laser pulses**

A novel microwelding procedure to join Si-to-glass using ps-laser pulses with high repetition rates is presented. The
procedure provides weld joint with mechanical strength as high as 85 MPa and 45 MPa in sample pairs of
Si/aluminosilicate (Si/SW-Y) and Si/borosilicate (Si/Borofloat 33), respectively, which are higher than anodic bonding, at
high spatial resolution (< 20 μm) and very high throughput without pre- and post-heating. Laser-matter interaction analysis
indicates that excellent weld joint of Si/glass is obtained by avoiding violent evaporation of Si substrate using ps-laser
pulses. Laser welded Si/glass samples can be singulated along the weld lines by standard blade dicer without defects,
demonstrating welding by ps-laser pulses is applicable to wafer-level packaging.
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.
Testing the near field/far field model performance for prediction of particulate matter emissions in a paint factory

A Near Field/Far Field (NF/FF) model is a well-accepted tool for precautionary exposure assessment but its capability to estimate particulate matter (PM) concentrations is not well studied. The main concern is related to emission source characterization which is not as well defined for PM emitters compared to e.g. for solvents. One way to characterize PM emission source strength is by using the material dustiness index which is scaled to correspond to industrial use by using modifying factors, such as handling energy factors. In this study we investigate how well the NF/FF model predicts PM concentration levels in a paint factory. PM concentration levels were measured during big bag and small bag powder pouring. Rotating drum dustiness indices were determined for the specific powders used and applied in the NF/FF model to predict mass concentrations. Modeled process specific concentration levels were adjusted to be similar to the measured concentration levels by adjusting the handling energy factor. The handling energy factors were found to vary considerably depending on the material and process even-though they have the same values as modifying factors in the exposure models. This suggests that the PM source characteristics and process-specific handling energies should be studied in more detail to improve the model-based exposure assessment.
In the field of surface engineering, cladding or overlay welding is a group of coating methods used in manufacturing fusion-bonded thick metallic and metal matrix composite (MMC) coatings on a wide variety of metallic base materials with varying degree of deposition rate, dilution and heat input. Growing demands for more material-, energy- and cost-effective overlay welding processes as well as sustainable solutions for performance-critical applications have boosted to develop methods that are capable of producing low diluted and fusion-bonded single layer coatings with high deposition rates. Such novel cladding methods include for instance laser-based high power laser cladding, coaxial hot-wire laser cladding, laser-arc hybrid cladding, non-laser-based Cold Metal Transfer (CMT) cladding and methods that utilize high intensity infrared (IR) light. This paper introduces some of such highly innovative cladding techniques and highlights some microstructural and geometrical features, abrasion and sliding wear, and wet corrosion properties of Fe-, Ni- and Co-based metallic coatings manufactured by novel laser and CMT cladding methods. The research results evidence that with the choice of optimal processing parameters, novel cladding techniques are capable of manufacturing high performance weld overlays with the properties equivalent or near to corresponding wrought alloys and reference overlays with net deposition rates of approximately 5 kg/h and more. Overall, the presented work suggests that discussed methods have high potential in surfacing of new and remanufacturing of service-damaged surfaces in high value components, in building up complex features on existing components and also in near net shape additive manufacturing of functional 3D objects.
Acid Leaching of Cu and Zn from a Smelter Slag with a Bacterial Consortium

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, CSIRO
Authors: Tuovinen, O. H., Särkijärvi, S., Peuraniemi, E., Junnikkala, S., Puhakka, J. A., Kaksonen, A. H.
Number of pages: 4
Pages: 660-663
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Advanced Materials Research
Volume: 1130
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
DOI: 10.4028/www.scientific.net/AMR.1130.660
Research output: Scientific - peer-review › Article

A model for anisotropic magnetostriction

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Mechanical Engineering and Industrial Systems, Research area: Applied Mechanics, Lund University, Aalto University
A new method to calculate natural convection heat transfer from a non-isothermal fin array

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanical Engineering and Industrial Systems, Research area: Applied Mechanics,
Research group: Lämpö- ja virtaustekniikka
Authors: Lampio, K., Karvinen, R.
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 7th Baltic Heat Transfer Conference, August 24-26 2015, Tallinn Estonia
Place of publication: Tallinn
Publisher: Tallinn University of Technology
Editors: Neshumayev, D., Sunden, B.
ISBN (Print): 978-9949-23-817-0

Publication series
Name: Baltic Heat Transfer Conference BHTC
Publisher: Tallinn University of Technology

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

A study of a condensing heat exchanger and electrostatic precipitator combination for small-scale wood combustion

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research area: Optics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Grigonyte, J., Sippula, O., Tissari, J., Laitinen, A., Keskinen, J., Kortelainen, M., Lamberg, H., Jokiniemi, J.
Publication date: 2015

Host publication information
Title of host publication: European Aerosol Conference 2015 : EAC 2015, Milan, Italy
Article number: 2COA_P021

Bibliographical note
ISBN kysytty, HO.
Research output: Professional › Conference contribution

Biological Nitrogen Removal from Acidic, Heavy-metal Containing Waters

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Brownfield process for the rationalisation of existing product variety towards a modular product family

Modularisation, product platforms, product families and product configuration are efficient product structuring tactics for providing of product variants for customers. This paper studies how the design information related to designing of modular product family that supports product configuration can be structured and how to support defining of this kind of design information in a design situation in which existing product assortment should be rationalised towards a modular product family that supports product configuration. Research approach bases on literature review and empirical findings. Categorisation to five design information elements including partitioning logic, set of modules, interfaces, architecture and configuration knowledge is suggested. Existing methods consider partly or as different combinations these elements but considering of all of them is rare although all of them have been recognised as important. Thus a design method known as the Brownfield Process is introduced. Steps of the method are tested in industrial cases. As a conclusion we state that the method can be applied also to other cases in which rationalisation of existing product assortment is sought.

Concentration and composition gradients of exhaust and non-exhaust particles near a major road

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanical Engineering and Industrial Systems, Research area: Design, Development and LCM
Authors: Pakkanen, J., Juutti, T., Lehtonen, T.
Number of pages: 10
Publication date: 2015

Host publication information
Title of host publication: ICED 15, vol 7: Product Modularisation, Product Architecture, Systems Engineering, Product Service Systems
Volume: 7
Publisher: The Design Society
Editors: Weber, C., Husung, S., Cascini, G., Cantamessa, M., Marjanovic, D., Rotini, F.
ISBN (Print): 978-1-904670-70-4
Different types of non-volatile nanoparticles in off-road diesel engine exhaust

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Kuuluvainen, H., Karjalainen, P., Saukko, E., Nilsson, O., Sirviö, K., Ovaska, T., Niemi, S., Keskinen, J., Rönnkö, T.
Publication date: 2015

Host publication information
Title of host publication: EAC 2015, European Aerosol Conference, 6-11 September, 2015, Milan, Italy

Driving forces of road freight CO2 in 2030
Purpose - Road freight carbon dioxide (CO2) emissions are determined by a complex interaction between shippers and hauliers within the boundaries set by regulations and economic factors. It is necessary to gain understanding about the various driving forces and trends affecting these to promote low carbon future. The purpose of this paper is to find out what factors affect the long-term future development of road freight CO2 emissions and whether the long-term emission targets will be achieved. Design/methodology/approach - An international comparison of similar Delphi surveys is carried out in Finland, Norway, and Sweden. Findings - The Delphi surveys indicate that the structural change of the economy, changes of consumer habits, concerns of energy and environment and changes in logistics practices and technology are the overarching trends shaping the future of the energy efficiency and CO2 emissions of road freight transport. The expert forecasts for Finland and Sweden highlight that reaching the carbon emission target of 30 per cent reduction for the year 2030 is possible. However, the CO2 emissions may also increase significantly even though the CO2 intensity would decrease, as the Norwegian forecast shows. Originality/value - This study combined quantitative and qualitative analysis. The results confirmed that similar factors are seen to affect the future in all three countries, but with some national differences in the likely effects of the factors. Future research using the same methodology would enable wider analysis of the global significance of these driving forces.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Information Management and Logistics, Research group: Transport Research Centre Verne, Life Cycle Effectiveness of the Built Environment (LCE@BE)
Authors: Liimatainen, H., Hovi, I. B., Arvidsson, N., Nykänen, L.
Number of pages: 26
Pages: 260-285
Publication date: 2015
Peer-reviewed: Yes

Publication information
Volume: 45
Issue number: 3
ISSN (Print): 0960-0035
Effects of fungal species, cultivation time, growth substrate, and air exposure velocity on the fluorescence properties of airborne fungal spores

Real-time bioaerosol monitoring is possible with fluorescence based instruments. This study provides information on major factors that can affect the fluorescence properties of airborne fungal spores. Two fluorescence-based bioaerosol detectors, BioScout, and ultraviolet aerodynamic particle sizer (UVAPS), were used to study fluorescent particle fractions (FPFs) of released spores of three fungal species (Aspergillus versicolor, Cladosporium cladosporioides, and Penicillium brevicompactum). Two culture media (agar and gypsum board), three ages of the culture (one week, one month, and four months), and three aerosolization air velocities (5, 15, and 27 m/s) were tested. The results showed that the FPF values for spores released from gypsum were typically lower than for those released from agar indicating that poor nutrient substrate produces spores with lower amounts of fluorescent compounds. The results also showed higher FPF values with lower air velocities in aerosolization. This indicates that easily released fully developed spores have more fluorescent compounds compared to forcibly extracted non-matured spores. The FPFs typically were lower with older samples. The FPF results between the two instruments were similar, except with four-month-old samples. The results can be utilized in field measurements of fungal spores to estimate actual concentrations and compare different instruments with fluorescence-based devices as well as in instrument calibration and testing in laboratory conditions. © 2015 John Wiley
Effects of vehicle technology on real exhaust particle emissions from city buses

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics
Authors: Pirjola, L., Dittrich, A., Niemi, J. V., Saarikoski, S., Malinen, A., Kuuluvainen, H., Wihersaari, H., Timonen, H., Kousa, A., Rönkkö, T., Hillamo, R.
Publication date: 2015

Host publication information
Title of host publication: AT 2015, Aerosol Technology, June 15-17, 2015, Tampere, Finland

Electricity generation from tetrathionate in microbial fuel cells by acidophiles

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Sulonen, M. L., Kokko, M. E., Lakaniemi, A., Puhakka, J. A.
Number of pages: 8
Pages: 182-189
Publication date: 2015
Peer-reviewed: Yes
Erosion testing of filled and/or reinforced vinyl ester composites in water medium at elevated temperature

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Materials Science, Research group: Plastics and Elastomer Technology, Outotec Research Center
Authors: Siljander, S., Kiviniemi, M., Sarlin, E., Lindgren, M., Suihkonen, R., Vuorinen, J.
Number of pages: 10
Publication date: 2015

Host publication information
Title of host publication: Proceedings of the 20th International Conference on Composite Materials
Links:
http://iccm20.org/fullpapers/file?f=BJk14rEQqP

Bibliographical note
ISBN kysytty, ei löydy / TL
Research output: Professional › Conference contribution

Experimental and numerical study of a choke valve in a turbulent flow
This study investigates a flow past a choke valve by experimental and numerical means. The flow profile after a choke valve with high Reynolds number of approximately 1,000,000 was measured using a LDV and computed using RANS simulations. Two turbulence models were used for the simulation, namely k-ε and k-ω turbulence models. It was found out that the k-ω model produces more similar results to LDV measurements than the k-ε model. This study also reports citable flow profiles past a choke valve computed by both turbulence models. Furthermore, the accuracy of the LDV based volume flow measurements was also discussed. The volume flow estimates were compared with simulation results, and with flow meter results. Results showed that LDV can be used for volume flow estimation even in unsymmetrical situations, such as after the choke valve, with error ranging from 0.3% to 2.6%.
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 gdw⁻¹) 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.
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 unravelled 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.

Gas and particle composition and properties of photochemically aged ship plumes using chemical ionization and aerosol mass spectrometry

Groundwater as a source of conflict and cooperation: Towards creating mutual gains in a Finnish water supply project
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.

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, Life Cycle Effectiveness of the Built Environment (LCE@BE)
Authors: Kurki, V., Katko, T. S.
Number of pages: 15
Pages: 337-351
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Water Alternatives
Volume: 8
Issue number: 3
ISSN (Print): 1965-0175
Ratings:
Scopus rating (2016): SJR 1.012 SNIP 1.309 CiteScore 2.09
Scopus rating (2015): SJR 0.85 SNIP 1.438 CiteScore 2.35
Scopus rating (2014): SJR 1.081 SNIP 1.48 CiteScore 1.92
Scopus rating (2013): SJR 0.89 SNIP 1.076 CiteScore 1.71
Scopus rating (2012): SJR 0.747 SNIP 1.305 CiteScore 1.59
Scopus rating (2011): SJR 0.737 SNIP 1.312 CiteScore 1.3
Scopus rating (2010): SJR 0.647 SNIP 1.175
Scopus rating (2009): SJR 0.975 SNIP 2.766
Original language: English
Keywords: Case-study, Conflict assessment, Finland, Groundwater, Integrative negotiation, Mutual gains approach
ASJC Scopus subject areas: Management, Monitoring, Policy and Law, Geography, Planning and Development, Political Science and International Relations
Links:
Links:
http://www.scopus.com/inward/record.url?scp=84948137804&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84948137804
Research output: Scientific - peer-review › Article

Industrial Tools for micromanipulation

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Authors: Gauthier, M., Clevy, C., Kallio, P., Heriban, D.
Number of pages: 23
Pages: 369-392
Publication date: 2015

Host publication information
Title of host publication: Micro- and Nanomanipulation Tools
Publisher: Wiley
Editors: Sun, Y., Liu, X.
ISBN (Print): 978-3-527-33784-2
Lung deposited surface area size distributions in different urban areas

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Kuuluvainen, H., Järvinen, A., Pirjola, L., Niemi, J. V., Hillamo, R., Keskinen, J., Rönkkö, T.
Publication date: 2015

Host publication information
Title of host publication: AT 2015, Aerosol Technology, June 15-17, 2015, Tampere, Finland

Bibliographical note
ISBN kysytty, HO. Ei ole, HO.
Research output: Professional ▶ Conference contribution

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 metalloid contamination, little progress has been made towards metalloid 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<sub>2</sub> particles, and removal of metal ions i.e. Co(III/II), Cr(VI), Cu(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 metalloid ions and pertaining removal mechanisms.

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry, Urban circular bioeconomy (UrCirBio), CSIR-Indian Institute of Chemical Technology, Bhabha Atomic Research Centre
Authors: Nancharaiah, Y. V., Venkata Mohan, S., Lens, P.
Number of pages: 13
Pages: 102-114
Publication date: 2015
Peer-reviewed: Yes
Early online date: 17 Jun 2015

Publication information
Journal: Bioresource Technology
Volume: 195
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
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 h⁻¹), but also the soil samples collected from other cover structures were oxidising CH₄ (0.41 µmol CH₄ g⁻¹ dw 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 h⁻¹ to < 0.085 µmol CH₄ g⁻¹ dw 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 h⁻¹) suggesting that this was attributable to stimulation of the enzymatic activity of the psychrotolerant methanotrophs.
Micro-factories

Micro- and desktop factories are small-size production systems suitable for the manufacture of small products with micro- and/or macro-size features. The development originates in Japan, where small machines were developed in order to save resources when producing small products. In the late 1990s, the research spread around the world, and since then multiple miniaturized production systems, both academic and commercial, have been developed. Academic research literature speculates with several advantages of using miniaturized production equipment ranging from reduced use of energy and other resources to better operator ergonomics, and from greater equipment flexibility to ubiquitous manufacturing (manufacturing on the spot). This paper will give a thorough introduction to existing micro-factory solutions and their potential application areas. It will also discuss the benefits of miniaturized production systems compared to traditional larger scale systems from three sustainability perspectives, namely environmental, economic, and social ones.

General information
State: Published
Ministry of Education publication type: B2 Part of a book or another research book
Organisations: Department of Mechanical Engineering and Industrial Systems, Research area: Engineering Intelligence, Research area: Life-cycle Management, Research area: Manufacturing and Automation
Authors: Järvenpää, E., Heikkilä, R., Siltala, N., Prusi, T., Tuokko, R.
Pages: 549-579
Publication date: 2015

Host publication information
Title of host publication: Micromanufacturing Engineering and Technology
Publisher: Elsevier
Edition: 2
ISBN (Print): 978-0-323-31149-6
Keywords: Desktop factory, Micro-factory, Modular production system, Reconfigurable production system, Sustainable manufacturing, TUT-micro-factory concept
DOI: 10.1016/B978-0-323-31149-6.00023-2
Research output: Scientific > Chapter

Physical and chemical properties of real exhaust particle emissions from city buses

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics
Authors: Pirjola, L., Dittrich, A., Niemi, J. V., Saarikoski, S., Malinen, A., Kuuluvainen, H., Whersaar, H., Timonen, H., Kousa, A., Rönkkö, T., Hillamo, R.
Publication date: 2015

Host publication information
Title of host publication: EAC 2015, European Aerosol Conference, 6-11 September, 2015, Milan, Italy

Bibliographical note
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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Number of pages: 9
Pages: 12899-12907
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Physical Chemistry Chemical Physics
Volume: 17
Issue number: 19
ISSN (Print): 1463-9076
Ratings:
Scopus rating (2016): CiteScore 4.06 SJR 1.678 SNIP 1.117
Scopus rating (2015): SJR 1.771 SNIP 1.244 CiteScore 4.45
Scopus rating (2014): SJR 1.772 SNIP 1.253 CiteScore 4.29
Scopus rating (2013): SJR 1.715 SNIP 1.216 CiteScore 4.05
Scopus rating (2012): SJR 1.916 SNIP 1.184 CiteScore 3.67
Scopus rating (2011): SJR 1.697 SNIP 1.203 CiteScore 3.6
Scopus rating (2010): SJR 1.802 SNIP 1.196
Scopus rating (2009): SJR 2.127 SNIP 1.369
Scopus rating (2008): SJR 2.158 SNIP 1.211
Scopus rating (2007): SJR 1.84 SNIP 1.138
Scopus rating (2006): SJR 1.467 SNIP 1.128
Scopus rating (2005): SJR 1.389 SNIP 1.104
Scopus rating (2004): SJR 1.173 SNIP 1.007
Scopus rating (2003): SJR 1.093 SNIP 0.925
Scopus rating (2002): SJR 1.122 SNIP 0.973
Scopus rating (2001): SJR 1.09 SNIP 0.914
Scopus rating (2000): SJR 0.948 SNIP 1.068
Scopus rating (1999): SJR 0.121 SNIP 0
Original language: English
Keywords: ALPHA-FE2O3 THIN-FILMS, PHOTOELECTROCHEMICAL PERFORMANCE, NANOSTRUCTURED ALPHA-FE2O3, HYDROTHERMAL METHOD, WATER OXIDATION
Electronic versions:
Seasonal and diurnal variations of fluorescent bioaerosol concentration and size distribution in the urban environment

A recently introduced fluorescence based real-time bioaerosol instrument, BioScout, and an ultraviolet aerodynamic particle sizer (UVAPS) were used to study fluorescent bioaerosol particles (FBAP) in the Helsinki metropolitan area, Finland, during winter and summer. Two FBAP modes at 0.5–1.5 µm (fine) and 1.5–5 µm (coarse) were detected during the summer, whereas the fine mode dominated in the winter. The concentration and proportion of the coarse FBAP was high in summer (0.028 #/cm$^3$, 23%) and low in winter (0.010 #/cm$^3$, 6%). Snow cover and low biological activity were assumed to be the main reasons for the low coarse FBAP concentration in the wintertime. Both the fine and the coarse FBAP fraction typically increased at nighttime during the summer. Correlations between the BioScout and the UVAPS were high with the coarse (R = 0.83) and fine (R = 0.92) FBAP. The BioScout showed 2.6 and 9.7 times higher detection efficiencies for the coarse and fine FBAP, respectively, compared to the UVAPS. A long-range transport episode of particles from Eastern Europe increased the fine FBAP concentration by over two orders of magnitude compared to the clean period in the winter, but these FBAP probably also included fluorescent non-biological particles. Correlation analysis indicates that local combustion sources did not generate fluorescent non-biological particles that can disturb fine FBAP counting. The results provide information that can be used to estimate health risks and climatic relevance of bioaerosols in the urban environment.
Small biomass boiler particle removal system

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research area: Optics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Laitinen, A., Keskinen, J., Janka, K.
Publication date: 2015

Host publication information
Title of host publication: Aerosol Technology Conference 2015, 14.-15. June, Tampere
Keywords: small scale biomass combustion, particle removal, ESP
Research output: Professional › Conference contribution

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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O., Takala, A.
Number of pages: 15
Pages: 844-858
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Water Alternatives
Volume: 8
Issue number: 1
ISSN (Print): 1965-0175
Ratings:
Scopus rating (2016): SJR 1.012 SNIP 1.309 CiteScore 2.09
Scopus rating (2015): SJR 0.85 SNIP 1.438 CiteScore 2.35
Scopus rating (2014): SJR 1.081 SNIP 1.48 CiteScore 1.92
Scopus rating (2013): SJR 0.89 SNIP 1.076 CiteScore 1.71
Scopus rating (2012): SJR 0.747 SNIP 1.305 CiteScore 1.59
Scopus rating (2011): SJR 0.737 SNIP 1.312 CiteScore 1.3
Scopus rating (2010): SJR 0.647 SNIP 1.175
Scopus rating (2009): SJR 0.975 SNIP 2.766
Original language: English
Keywords: Water services, Water pricing, Price fairness, Social Norms, Finland
Links:
http://www.water-alternatives.org/index.php/alldoc/articles/vol8/v8issue1/268-a8-1-12/file
Research output: Scientific - peer-review › Article

Some aspects on efficient solution of creep problems
Integration of inelastic constitutive models by implicit schemes, require local Newton’s iteration to solve the discretized non-linear evolution equations at the integration point level. Choice of the starting values in the Newton’s iteration affects on the success of the iteration at the local integration point level. This note describes a simple modification on the
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 L CH\(_4\)/kgVS), while water addition and leachate recirculation depressed methane production slightly, to 16.1 and 16.4 L CH\(_4\)/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 g COD/kgVS), compared with LBR without water addition or with leachate recirculation (51 g COD/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 mg O\(_2\)/gTS), and lowest methane production after treatment (0.0-0.8 L CH\(_4\)/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.
Struvite precipitation in raw and co-digested swine slurries for nutrients recovery in batch reactors

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\(^{+}\).
The correlation between gear contact friction and ball on disc friction measurements

Running experiments with full-size gearboxes from the actual application has the advantage of giving realistic results in terms of power losses. The drawback is extensive costs, lengthy testing, and the difficulty in differentiating between load dependent and load independent losses, and which losses are coming from the gears, seals, bearings or synchronizers. In this work, the correlation between friction measurements conducted in a ball-on-disc machine and friction measurements conducted in a back-to-back gear rig is investigated. The correlation between the gear tests and the ball-on-disc tests was reasonably good in terms of absolute values, and the shape of the friction curves was similar, indicating that the ball-on-disc measurements to a large extent are capturing the behavior of the gear contact.

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS), Luleå University of Technology, Department of Engineering Sciences and Mathematics, Division of Energy Science, Luleå University of Technology, Division of Machine Elements
Authors: Björling, M., Miettinen, J., Marklund, P., Lehtovaara, A., Larsson, R.
Number of pages: 6
Pages: 114-119
Publication date: 2015
Peer-reviewed: Yes
The critical velocity of rebound determined for sub-micron silver particles

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Physics, Research area: Aerosol Physics, Research group: Aerosol Synthesis, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group
Authors: Kuuluvainen, H., Arffman, A., Harra, J., Vuorinen, O., Juuti, J., Yli-Ojanperä, J., Mäkelä, J., Keskinen, J.
Publication date: 2015

Host publication information
Title of host publication: AT 2015, Aerosol Technology, June 15-17, 2015, Tampere, Finland

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.

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., Katko, T. S., Pietilä, P. E.
Number of pages: 19
Pages: 360-378
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Public Works Management and Policy
Volume: 20
Issue number: 4
ISSN (Print): 1087-724X
Ratings:
Scopus rating (2016): CiteScore 0.35 SJR 0.171 SNIP 0.481
Scopus rating (2015): SJR 0.243 SNIP 0.423 CiteScore 0.38
Using maintenance data for extended warranty simulation

General information
State: Published
Ministry of Education publication type: D3 Professional conference proceedings
Organisations: Department of Mechanical Engineering and Industrial Systems, Research group: Käyttövarmuuden suunnittelu ja kunnonaspito, Research area: Life-cycle Management
Authors: Mahlamäki, K., Jokinen, J., Borgman, J., Niemi, A., Rämänen, J.
Number of pages: 7
Publication date: 2015

Host publication information
Title of host publication: COMADEM 2014, Implications of life cycle analysis in asset and maintenance management, 16-18 September 2014, Brisbane Convention and Exhibition Centre, Australia

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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
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.
**Method and apparatus for cooling material by atomised spray**

The invention relates to a method and apparatus for tempering material. According to the invention, one or more liquids are atomized by at least one sprayer into droplets which are guided towards a surface of a hot material so that at least some of the droplets collide with the surface of the hot material and evaporate, thus removing thermal energy from the surface layer of the hot material. Impact members may be used to further reduce the size of the droplets. The droplets may be guided to the surface by a separate guiding gas flow.

**Rationally engineered synthetic coculture for improved biomass and product formation**

In microbial ecosystems, bacteria are dependent on dynamic interspecific interactions related to carbon and energy flow. Substrates and end-metabolites are rapidly converted to other compounds, which protects the community from high concentrations of inhibitory molecules. In biotechnological applications, pure cultures are preferred because of the more straightforward metabolic engineering and bioprocess control. However, the accumulation of unwanted side products can limit the cell growth and process efficiency. In this study, a rationally engineered coculture with a carbon channeling system was constructed using two well-characterized model strains Escherichia coli K12 and Acinetobacter baylyi ADP1. The directed carbon flow resulted in efficient acetate removal, and the coculture showed symbiotic nature in terms of substrate utilization and growth. Recombinant protein production was used as a proof-of-principle example to demonstrate the coculture utility and the effects on product formation. As a result, the biomass and recombinant protein titers of E. coli were enhanced in both minimal and rich medium simple batch cocultures. Finally, harnessing both the strains to the production resulted in enhanced recombinant protein titers. The study demonstrates the potential of rationally engineered cocultures for synthetic biology applications.
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.

Vehicle nanoparticle emissions under transient driving conditions

Real-world driving consist mostly of transients, where the engine parameters are constantly changing. In emission regulation this has been partially considered by including transient driving cycles in emission standards. However, specific particle emissions data for detailed driving conditions have remained limited. This thesis covers results of transient exhaust particle emissions, including both diesel and gasoline engines. The experiments were performed in laboratories and on the road. The focus was always on the real-world particle emissions. During transient cycles both heavy-duty (HD) diesel engines and light-duty (LD) gasoline vehicles produced elevated soot particle concentrations during accelerations. For instance, in on-road experiment of a LD gasoline vehicle, the exhaust plume particle concentrations at steady speeds were at clean ambient levels, but during accelerations concentrations were 10-50 times the background level. For gasoline vehicles the soot particle size distributions were bi-modal in nature. Currently neither LD gasoline nor nonroad HD diesel engines necessarily need to employ particle filtration in the exhaust system in order to meet the demands of the relevant...
legislation. Sulfur originating in the fuel or lubricant oil can be stored inside catalysts, and later be released, forming semivolatile nucleation mode (NM) particles when temperature rises. This behavior was detected for LD and HD engines in the engine laboratory, for a HD vehicle on the road and in a simplified measurement setup in an aerosol laboratory. The aerosol laboratory test indicated that the NM formation does not necessarily require hydrocarbons or sulfated hydrocarbons; particles are electrically neutral and evaporate when they undergo thermal treatment. While sulfur is released from the catalysts, the HD road engine study indicated that the increased NM particle emission is not explained by the concentration of gaseous sulfuric acid. The sulfur storage and release depends greatly on the driving history, also due to this NM particle emissions seem plausible, even with low sulfur fuels. With catalytic particle filters, the amount of soot is reduced, promoting semivolatile NM particle emissions. An unexpected observation was made that some engines produce nanoparticles containing lubricant oil derived metals during driving while not fueled. Exhaust particles were observed during engine braking events for a HD truck and LD gasoline vehicles. For the truck and gasoline vehicles, the engine braking related particles contributed up to 20-30% and 3-30% of the total number emissions, respectively. These particle emissions can be a reality for all vehicle types not using particle filtration, including the latest technology vehicles. In particle filters, engine braking related particles can affect the ash accumulation and transport mechanisms.

General information
State: Published
Ministry of Education publication type: G5 Doctoral dissertation (article)
Organisations: Research area: Aerosol Physics, Department of Physics
Authors: Karjalainen, P.
Number of pages: 121
Publication date: 21 Nov 2014

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

Publication series
Name: Tampere University of Technology. Publication
Publisher: Tampere University of Technology
Volume: 1268
ISSN (Print): 1459-2045
Electronic versions:
karjalainen.pdf
Links:

Bibliographical note
Awarding institution:Tampere University of Technology
Source: researchoutputwizard
Source-ID: 664
Research output: Collection of articles > Doctoral Thesis

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.

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, Tampere University of Technology, Urban circular bioeconomy (UrCirBio), Department of Microbiology, University of Delhi South Campus, Lignocellulose Biotechnology Laboratory
Authors: Raghuvanshi, S., Deswal, D., Karp, M., Kuhad, R. C.
Number of pages: 7
Pages: 183-189
Publication date: 15 May 2014
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.
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 alkalitolerant 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 P₄H₂). With the H₂ production in mind, acidic pH and low P₄H₂ should be preferred for a high yield-oriented process, while a high productivity-oriented process can be achieved at alkaline pH and high P₄H₂. © 2014 Ciranna et al.; licensee BioMed Central Ltd.

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.

Aerosol Sampling and Transport

State: Published
Ministry of Education publication type: A3 Part of a book or another research book
Organisations: Department of Physics, Research area: Optics, Research group: The Instrumentation, Emissions, and Atmospheric Aerosols Group, Research area: Aerosol Physics, Fortum Power and Heat Oy
Authors: Keskinen, J., Marjamäki, M.
Number of pages: 22
Pages: 63-84
Publication date: 2014

Host publication information
Title of host publication: Bioaerosol Detection Technologies : Part I
Place of publication: New York, NY
Publisher: Springer
Editors: Jonsson, P., Olofsson, G., Tjärnhage, T.
ISBN (Print): 978-1-4419-5582-1

Publication series
Name: Integrated Analytical Systems
ISSN (Print): 2196-4475
A geographical information system (GIS) based methodology for determination of potential biomasses and sites for biogas plants in southern Finland

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Höhn, J., Lehtonen, E., Rasi, S., Rintala, J.
Number of pages: 10
Pages: 1-10
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Applied Energy
Volume: 113
ISSN (Print): 0306-2619
Ratings:
Scopus rating (2016): SJR 3.058 SNIP 2.573 CiteScore 7.78
Scopus rating (2015): SJR 2.912 SNIP 2.61 CiteScore 6.4
Scopus rating (2014): SJR 3.254 SNIP 3.28 CiteScore 6.93
Scopus rating (2013): SJR 3.164 SNIP 3.377 CiteScore 6.59
Scopus rating (2012): SJR 2.854 SNIP 3.108 CiteScore 5.69
Scopus rating (2011): SJR 2.473 SNIP 2.84 CiteScore 5.5
Scopus rating (2010): SJR 1.516 SNIP 2.25
Scopus rating (2009): SJR 1.003 SNIP 1.781
Scopus rating (2008): SJR 0.974 SNIP 1.215
Scopus rating (2007): SJR 1.179 SNIP 1.709
Scopus rating (2006): SJR 0.979 SNIP 1.293
Scopus rating (2005): SJR 1.043 SNIP 0.996
Scopus rating (2004): SJR 0.643 SNIP 0.839
Scopus rating (2003): SJR 0.778 SNIP 0.797
Scopus rating (2002): SJR 0.577 SNIP 0.775
Scopus rating (2001): SJR 0.376 SNIP 0.578
Scopus rating (2000): SJR 0.352 SNIP 0.515
Scopus rating (1999): SJR 0.182 SNIP 0.45
Original language: English
DOIs:
10.1016/j.apenergy.2013.07.005

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-02-15
Source: researchoutputwizard
Source-ID: 488
Research output: Scientific - peer-review › Article

Anaerobic digestion of autoclaved and untreated food waste

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Tampio, E., Ervasti, S., Paavola, T., Heaven, S., Banks, C., Rintala, J.
Number of pages: 8
Application of Design Review to Probabilistic Risk Assessment in a Large Investment Project

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Virtanen, S., Penttinen, J., Kiiski, M., Jokinen, J.
Number of pages: 12
Pages: 1-12
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the Probabilistic Safety Assessment and Management PSAM12, June 2014, Honolulu, Hawaii
Links:

Bibliographical note
Contribution: organisation=mei,FACT1=1<br/>Portfolio EDEND: 2014-12-13
Source: researchoutputwizard
Source-ID: 1754
Research output: Scientific - peer-review › Conference contribution
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.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Chemistry and Bioengineering, Research group: Industrial Bioengineering and Applied Organic Chemistry
Authors: Kaarela, O. E., Härkki, H. A., Palmroth, M. R., Tuhkanen, T. A.
Number of pages: 12
Pages: 681-692
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Environmental Technology
ISSN (Print): 0959-3330
Ratings:
Scopus rating (2016): CiteScore 1.6 SJR 0.528 SNIP 0.747
Scopus rating (2015): SJR 0.633 SNIP 0.772 CiteScore 1.63
Scopus rating (2014): SJR 0.618 SNIP 0.781 CiteScore 1.39
Scopus rating (2013): SJR 0.488 SNIP 0.672 CiteScore 1.3
Scopus rating (2012): SJR 0.645 SNIP 0.877 CiteScore 1.47
Scopus rating (2011): SJR 0.597 SNIP 0.691 CiteScore 1.35
Scopus rating (2010): SJR 0.491 SNIP 0.473
Scopus rating (2009): SJR 0.395 SNIP 0.422
Scopus rating (2008): SJR 0.422 SNIP 0.581
Scopus rating (2007): SJR 0.419 SNIP 0.596
Scopus rating (2006): SJR 0.475 SNIP 0.556
Scopus rating (2005): SJR 0.505 SNIP 0.689
Scopus rating (2004): SJR 0.676 SNIP 0.649
Scopus rating (2003): SJR 0.538 SNIP 0.641
Scopus rating (2002): SJR 0.673 SNIP 0.734
Scopus rating (2001): SJR 0.586 SNIP 0.904
Scopus rating (2000): SJR 0.606 SNIP 0.788
Scopus rating (1999): SJR 0.631 SNIP 0.768
Original language: English
DOIs:
10.1080/09593330.2014.958542

Bibliographical note
Published online: 22 Sep 2014<br/>Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-10-15<br/>Publisher name: Taylor & Francis Ltd.
Source: researchoutputwizard
Source-ID: 629
Research output: Scientific - peer-review › Article

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: 2
Pages: 273-274
Publication date: 2014
Peer-reviewed: No

Publication information
Journal: Water Alternatives
Volume: 7
Issue number: 1
Ratings:
Scopus rating (2016): SJR 1.012 SNIP 1.309 CiteScore 2.09
Scopus rating (2015): SJR 0.85 SNIP 1.438 CiteScore 2.35
Scopus rating (2014): SJR 1.081 SNIP 1.48 CiteScore 1.92
Scopus rating (2013): SJR 0.89 SNIP 1.076 CiteScore 1.71
Scopus rating (2012): SJR 0.747 SNIP 1.305 CiteScore 1.59
Scopus rating (2011): SJR 0.737 SNIP 1.312 CiteScore 1.3
Scopus rating (2010): SJR 0.647 SNIP 1.175
Scopus rating (2009): SJR 0.975 SNIP 2.766
Original language: English
Links:
http://www.water-alternatives.org/

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-02-15<br/>Publisher name: Water Alternatives Association
Source: researchoutputwizard
Source-ID: 678
Research output: Scientific › Article

Characterization and Response Model of the PPS-M Aerosol Sensor

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Aerosol Physics, Department of Physics, Urban circular bioeconomy (UrCirBio)
Authors: Rostedt, A., Arffman, A., Janka, K., Yli-Ojanperä, J., Keskinen, J.
Number of pages: 9
Pages: 1022-1030
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Aerosol Science and Technology
Volume: 48
Issue number: 10
ISSN (Print): 0278-6826
Ratings:
Scopus rating (2016): CiteScore 1.88 SJR 0.943 SNIP 0.853
Scopus rating (2015): SJR 1.284 SNIP 1.009 CiteScore 2.42
Scopus rating (2014): SJR 1.365 SNIP 1.099 CiteScore 2.74
Scopus rating (2013): SJR 1.521 SNIP 1.514 CiteScore 2.94
Scopus rating (2012): SJR 1.408 SNIP 1.038 CiteScore 2.58
Characterization of fine fraction from landfill mining for evaluating methane potential

General information
State: Published
Ministry of Education publication type: B3 Non-refereed article in conference proceedings
Organisations: Department of Chemistry and Bioengineering
Authors: Mönkäre, T., Palmroth, M., Rintala, J.
Publication date: 2014

Host publication information
Place of publication: Italy
Publisher: CISA Publisher
ISBN (Print): 978-88-6265-085-4

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: Taylor & Francis Inc.; American Association for Aerosol Research
Source: researchoutputwizard
Source-ID: 1406
Research output: Scientific - peer-review › Article

Chemical composition and size of particles in emissions of a coal-fired power plant with flue gas desulfurization

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Aerosol Physics, Department of Physics, Urban circular bioeconomy (UrCirBio)
Number of pages: 13
Pages: 14-26
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Aerosol Science
Volume: 73
Concerns over students role as test users in virtual environments

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Tiainen, T., Ellman, A.
Number of pages: 8
Pages: 11-18
Publication date: 2014

Host publication information
Title of host publication: Proceedings of the 18th Academic MindTrek Conference 2014 "Media business, management, content & services" 4-6 November, 2014, Tampere, Finland
Place of publication: New York, NY
Publisher: The Association for Computing Machinery
Editors: Lugmayr, A., Franssila, H., Paavilainen, J.
ISBN (Print): 978-1-4503-3006-0

Bibliographical note
Contribution: organisation=mei,FACT1=1<br/>Portfolio EDEND: 2014-12-13
Source: researchoutputwizard
Source-ID: 1626
Research output: Scientific - peer-review › Conference contribution

Effect of arsenic on nitrification of simulated mining water

General information
State: Published
Publication information
Journal: Bioresource Technology
Volume: 164
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
DOIs:
10.1016/j.biortech.2014.04.072

Bibliographical note
Contribution: organisation=keb,FACT1=1
Portfolio EDEND: 2014-05-28
Publisher name: Elsevier BV
Source: researchoutputwizard
Source-ID: 1229
Research output: Scientific - peer-review › Article

Effect of test parameters on large particle high speed slurry erosion testing

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Number of pages: 7
Pages: 98-104
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Tribology: Materials, Surfaces and Interfaces
Volume: 8
Issue number: 2
ISSN (Print): 1751-5831
Ratings:
Scopus rating (2016): SJR 0.297 SNIP 0.464 CiteScore 0.64
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
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Proceedings of the Estonian Academy of Sciences
Volume: 63
Issue number: 2S
ISSN (Print): 1736-6046
Ratings:
Scopus rating (2016): CiteScore 0.52 SJR 0.238 SNIP 0.45
Scopus rating (2015): SJR 0.195 SNIP 0.863 CiteScore 0.77
Scopus rating (2014): SJR 0.198 SNIP 0.581 CiteScore 0.42
Scopus rating (2013): SJR 0.218 SNIP 0.671 CiteScore 0.52
Scopus rating (2012): SJR 0.199 SNIP 0.474 CiteScore 0.53
Scopus rating (2011): SJR 0.312 SNIP 0.644 CiteScore 0.66
Scopus rating (2010): SJR 0.289 SNIP 0.438
Scopus rating (2009): SJR 0.19 SNIP 0.246
Scopus rating (2008): SJR 0.104 SNIP 0.185
Scopus rating (2007): SJR 0.104 SNIP 0.192
Original language: English
DOIs:
10.3176/proc.2014.2S.02

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-05-22<br/>Publisher name: Teaduste Akadeemia Kirjastus; Eesti Teaduste Akadeemia
Source: researchoutputwizard
EU Emission Trading Related CO2 Monitoring in Power Plants

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Automation Science and Engineering
Authors: Majanne, Y., Korpela, T., Uotila, T.
Number of pages: 6
Pages: 1361-1366
Publication date: 2014

Host publication information
Title of host publication: Proceedings of 19th IFAC World Congress, Cape Town, South Africa, August 24-29, 2014
Publisher: International Federation of Automatic Control
Editors: Boje, E., Xia, X.

Publication series
Name: IFAC proceedings volumes
Publisher: International Federation of Automatic Control
Volume: 19
No.: 1
ISSN (Print): 1474-6670
DOI:
10.3182/20140824-6-ZA-1003.02230
Links:
http://www.ifac-papersonline.net/Detailed/65641.html

Bibliographical note
Contribution: organisation=ase,FACT1=1<br/>Portfolio EDEND: 2014-11-21
Source: researchoutputwizard
Source-ID: 996
Research output: Scientific - peer-review › Conference contribution

EURAMET comparison 1244, Comparison of aerosol electrometers. Issue 2: EURAMET Report

General information
State: Published
Ministry of Education publication type: D4 Published development or research report or study
Organisations: Research area: Aerosol Physics, Department of Physics
Authors: Quincey, P., Sarantaridis, D., Yli-Ojanperä, J., Keskinen, J., Högström, R., Heinonen, M., Luönd, F., Nowak, A., Riccobono, F., Tuch, T., Sakurai, H., Owen, M.
Number of pages: 39
Publication date: 2014

Publication information
Publisher: Unknown Publisher
Original language: English

Publication series
Name: NPL Report
No.: 85
ISSN (Print): 1754-2928

Bibliographical note
Contribution: organisation=fys,FACT1=1<br/>Portfolio EDEND: 2014-09-22
Source: researchoutputwizard
Source-ID: 1320
Research output: Professional › Commissioned report

Exhaust particles of modern gasoline vehicles: A laboratory and an onroad study
Fluidized-bed denitrification for mine waters. Part II: effects of Ni and Co
Functional failure modes cause-consequence logic suited for mobile robots used at scientific facilities

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Douzi, I. K., Virtanen, S., Bonnal, P., Verma, A.
Number of pages: 9
Pages: 10-18
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Reliability Engineering and System Safety
Volume: 129
ISSN (Print): 0951-8320
Ratings:
- Scopus rating (2016): SJR 1.407 SNIP 2.366 CiteScore 3.78
- Scopus rating (2015): SJR 1.373 SNIP 2.403 CiteScore 3.93
- Scopus rating (2014): SJR 1.467 SNIP 2.714 CiteScore 3.4
- Scopus rating (2013): SJR 1.381 SNIP 2.939 CiteScore 3.28
- Scopus rating (2012): SJR 1.566 SNIP 3.008 CiteScore 3.55
- Scopus rating (2011): SJR 0.825 SNIP 2.945 CiteScore 3.15
- Scopus rating (2010): SJR 1.268 SNIP 2.345
- Scopus rating (2009): SJR 1.198 SNIP 2.634
- Scopus rating (2008): SJR 0.95 SNIP 2.313
- Scopus rating (2007): SJR 0.77 SNIP 2.13
- Scopus rating (2006): SJR 0.692 SNIP 1.944
- Scopus rating (2005): SJR 0.544 SNIP 1.667
- Scopus rating (2004): SJR 0.489 SNIP 1.623
Heavy-duty, off-road diesel engine low-load particle number emissions and particle control

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Aerosol Physics, Department of Physics, Urban circular bioeconomy (UrCirBio)
Authors: Lähde, T., Virtanen, A., Happonen, M., Söderström, C., Kytö, M., Keskinen, J.
Number of pages: 9
Pages: 1186-1194
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of the Air and Waste Management Association
Volume: 64
Issue number: 10
ISSN (Print): 1047-3289
Ratings:
Scopus rating (2016): SJR 0.669 SNIP 0.826 CiteScore 1.73
Scopus rating (2015): SJR 0.763 SNIP 0.919 CiteScore 1.67
Scopus rating (2014): SJR 0.678 SNIP 0.891 CiteScore 1.36
Scopus rating (2013): SJR 0.677 SNIP 0.889 CiteScore 1.4
Scopus rating (2012): SJR 0.736 SNIP 0.893 CiteScore 1.41
Scopus rating (2011): SJR 0.929 SNIP 1.03 CiteScore 1.63
Scopus rating (2010): SJR 1.056 SNIP 0.795
Scopus rating (2009): SJR 1.153 SNIP 1.129
Scopus rating (2008): SJR 1.07 SNIP 0.914
Scopus rating (2007): SJR 1.073 SNIP 0.947
Scopus rating (2006): SJR 1.172 SNIP 1.077
Scopus rating (2005): SJR 0.981 SNIP 0.997
Scopus rating (2004): SJR 0.9 SNIP 1.17
Scopus rating (2003): SJR 1.03 SNIP 1.02
Scopus rating (2002): SJR 1.128 SNIP 1.126
Scopus rating (2001): SJR 0.878 SNIP 1.108
Scopus rating (2000): SJR 0.92 SNIP 1.362
Scopus rating (1999): SJR 1.544 SNIP 1.347
Original language: English
DOI:
10.1080/10962247.2014.936985

Bibliographical note
**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: 2014-12-11
- Publisher name: I. B. Tauris
- Source: researchoutputwizard
- Source-ID: 681
- Research output: Scientific - peer-review → Chapter

**Hiukkaspäästöt suurennesslasin alla**

**General information**
- State: Published
- Ministry of Education publication type: D1 Article in a trade journal
- Organisations: Research area: Aerosol Physics, Department of Physics
- Authors: Rönkkö, T., saarikoski, S.
- Number of pages: 2
- Pages: 16-17
- Publication date: 2014
- Peer-reviewed: Unknown

**Publication information**
- Journal: Automaatioväylä
- Issue number: 3
- ISSN (Print): 0784-6428
- Original language: Finnish

**Bibliographical note**
- Contribution: organisation=fys,FACT1=1
- Portfolio EDEND: 2014-12-16
- Source: researchoutputwizard
- Source-ID: 1403
- Research output: Professional → Article

**Image based measurement techniques for particulate flows**

**General information**
- State: Published
- Ministry of Education publication type: G5 Doctoral dissertation (article)
- Organisations: Department of Mechanical Engineering and Industrial Systems
- Authors: Kolehmainen, J.
- Number of pages: 98
- Publication date: 2014
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.
Number of pages: 11
Pages: 247-257
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Water Research
Volume: 57
Ratings:
Scopus rating (2016): CiteScore 7.49 SJR 2.629 SNIP 2.558
Scopus rating (2015): SJR 2.689 SNIP 2.507 CiteScore 6.63
Scopus rating (2014): SJR 2.957 SNIP 2.727 CiteScore 6.13
Scopus rating (2013): SJR 2.956 SNIP 2.693 CiteScore 6.02
Scopus rating (2012): SJR 2.966 SNIP 2.456 CiteScore 5.15
Scopus rating (2011): SJR 2.867 SNIP 2.374 CiteScore 5.43
Scopus rating (2010): SJR 2.582 SNIP 2.196
Scopus rating (2009): SJR 2.319 SNIP 2.225
Scopus rating (2008): SJR 2.065 SNIP 2.19
Scopus rating (2007): SJR 1.994 SNIP 2.208
Scopus rating (2006): SJR 1.895 SNIP 2.214
Scopus rating (2005): SJR 2.114 SNIP 2.337
Scopus rating (2004): SJR 2.227 SNIP 2.106
Scopus rating (2003): SJR 1.696 SNIP 1.917
Scopus rating (2002): SJR 1.54 SNIP 1.775
Scopus rating (2001): SJR 1.321 SNIP 1.711
Scopus rating (2000): SJR 1.305 SNIP 1.688
Scopus rating (1999): SJR 1.456 SNIP 1.576
Original language: English
DOI:
10.1016/j.watres.2014.03.043

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-05-06<br/>Publisher name: I W A Publishing; Water Quality Association
Source: researchoutputwizard
Innovative tool for specifying customer requirements

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Ellman, A., Wendrich, R., Tiainen, T.
Number of pages: 5
Pages: 1-5
Publication date: 2014

Host publication information

Bibliographical note
Contribution: organisation=mei,FACT1=1<br/>Portfolio EDEND: 2014-12-30
Source: researchoutputwizard
Source-ID: 282
Research output: Scientific - peer-review › Conference contribution

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): SJR 0.536 SNIP 0.813 CiteScore 1.18
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:
Kohti hajautettua infrastruktuuripolitiikkaa?: 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
Volume: 51
Issue number: 1
ISSN (Print): 0505-3838
Original language: Finnish
Links:

Bibliographical note
Contribution: organisation=keb,FACT1=1
Portfolio EDEND: 2014-09-16
Publisher name: Maa- Ja Vesitekniikan Tuki
Source: researchoutputwizard
Source-ID: 1334
Research output: Scientific » Article

Lamella dissolved air flotation treatment of fish farming effluents as a part of an integrated farming and effluent treatment concept

General information
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
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
DOIs:
10.1016/j.wasman.2014.06.005

Bibliographical note
Contribution: organisation=keb_FACT1=1<br/>Portfolio EDEND: 2014-09-30<br/>Publisher name: Pergamon
Source: researchoutputwizard
Source-ID: 157
Research output: Scientific - peer-review › Article

Lähteet Suomen vesihuollossa

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., Juuti, P. S.
Number of pages: 4
Pages: 15-18
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Vesitalous
Issue number: 4
ISSN (Print): 0505-3838
Original language: Finnish

Bibliographical note
Contribution: organisation=keb_FACT1=1<br/>Portfolio EDEND: 2014-10-07
Source: researchoutputwizard
Source-ID: 677
Research output: Scientific - peer-review › Article

Measuring soot particles from automotive exhaust emissions

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Research area: Aerosol Physics, Department of Physics
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 in 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.
Method and apparatus for mechanical defibration of wood

General information
State: Published
Ministry of Education publication type: H1 Granted patent
Organisations: Former organisation of the author
Authors: Lukander, M., Björkqvist, T., Tuovinen, O.
Publication date: 2014

Publication information
Patent number: Pat. CA 2608207 C
Priority date: 25/03/14
Priority number: 2005/06/03 US 60/686,919 : 686919
Original language: English

Bibliographical note
US 7819149 B2 (julk2011) : CA2608207A1, CN101208472B
Contribution: organisation=ase,FACT1=1<br/>Portfolio EDEND: 2014-10-08
Source: researchoutputwizard
Source-ID: 971
Research output: Scientific › Patent

Mobile Particle and NOx Emission Characterization at Helsinki Downtown: Comparison of Different Traffic Flow Areas

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Aerosol Physics, Department of Physics, Urban circular bioeconomy (UrCirBio)
Authors: Lähde, T., Niemi, J. V., Kousa, A., Rönkkö, T., Karjalainen, P., Keskinen, J., Frey, A., Hillamo, R., Pirjola, L.
Number of pages: 11
Pages: 1372-1382
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Aerosol and Air Quality Research
Volume: 14
Issue number: 5
ISSN (Print): 1680-8584
Ratings:
Scopus rating (2016): SJR 0.934 SNIP 1.125 CiteScore 2.81
Scopus rating (2015): SJR 1.002 SNIP 1.118 CiteScore 2.68
Modeling of Age-Dependent Failure Tendency from Incomplete Data

This paper addresses modeling of age-dependent failure rates from incomplete data that includes interval-censored failure ages. Two estimators for cumulative failure rates are presented: a simple non-parametric estimator and a maximum-likelihood method based on the gamma distribution and the non-homogeneous Poisson process. The maximum-likelihood fit of familiar parametric models (e.g., the power law) to the available field data from an aircraft component was far from satisfactory, so a special three-parameter model function had to be worked out. The maximum-likelihood estimate obtained is then used for repeated random generation of different data sets akin to the field data. This way the effect of data set size, censoring rate, and randomness on the non-parametric estimate can be analyzed to get practical appraisals.

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanical Engineering and Industrial Systems, Research area: Life-cycle Management, Research group: Käyttövarmuuden suunnittelu ja kunnossapito
Authors: Hagmark, P., Laitinen, J.
Number of pages: 11
Pages: 449-459
Publication date: 2014
Physical properties of aerosol particles measured from a bubbling fluidized bed boiler
Increased use of biomass and waste fuels, and the consequent corrosion problem have led to an increased need to study and monitor the combustion processes. This study presents an extensive physical characterization of aerosol particles measured from a bubbling fluidized bed boiler with different fuel mixtures and optional ferric sulfate feeding. The fuel mixtures included bark, sludge, peat and solid recovered fuel. Previously, the characterization of the particles analyzed from a fluidized bed reactor has mainly focused on chemical off-line analysis of collected impactor samples, large coarse mode particles or laboratory-scale reactors. In this study, the focus is in the particle size range from 3 to 500 nm, where mobility size distributions, effective density, morphology and electric net charge of particles were measured and analyzed.
In the boiler, the particle size distribution in the measurement range was unimodal. Gas phase species formed a second smaller particle mode in the dilution. The number concentration of the smaller mode, peaking around 20 nm, was mostly dominating but variations were seen with respect to measurement location, fuel mixture and additive feeding. The effective density of these particles was approximately 1.4 g/cm³. The larger mode, peaking around 80 nm, was found to be more stable and the effective density of these particles decreased as a function of particle size, being 3-4 g/cm³ at the maximum. The results of this work suggest that the cores of these particles already exist in the boiler and partly consist of heavier lead and zinc compounds. The ferric sulfate feeding decreased the number and mass concentration of the smaller mode particles, which are formed in the sampling and dilution processes mainly from the gas phase alkali chlorides. These condensable species were also linked to the negative net charge of particles. This study deepens the understanding of the combustion process and the sampling of aerosol particles with an aspect of on-line monitoring.
Simulation Based Methods for Flexible Maintenance Program Development

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mechanical Engineering and Industrial Systems, Department of Industrial Management
Authors: Aaltonen, J., Koskinen, K. T., Vainio, H., Martinsuo, M.
Number of pages: 5
Pages: 446-450
Publication date: 2014

Host publication information
Title of host publication: EuroMaintenance 2014, Congress proceedings May 5-7, Helsinki, Finland, 22nd European Congress & Expo on Maintenance and Asset Management, 6th World Congress & Global Forum on Maintenance and Asset Management
Publisher: European Federation of National Maintenance Societies
ISBN (Print): 978-952-67981-1-0

Bibliographical note
Contribution: organisation=mei,FACT1=0.9
Portfolio EDEND: 2014-12-30
Publisher name: European Federation of National Maintenance Societies
Source-ID: 38
Research output: Scientific - peer-review » Conference contribution

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:
Scopus rating (2016): SJR 0.826 SNIP 0.864 CiteScore 2.54
Scopus rating (2015): SJR 1.022 SNIP 0.957 CiteScore 2.62
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

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-02-15<br/>Publisher name: Wiley - V C H Verlag GmbH & Co. KGaA
Source: researchoutputwizard
Source-ID: 1319
Research output: Scientific › peer-review › Article

Sulfur driven nucleation mode formation in diesel exhaust under transient driving conditions

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research area: Aerosol Physics, Department of Physics, Urban circular bioeconomy (UrCirBio)
Authors: Karjalainen, P., Rönkkö, T., Pirjola, L., Heikkilä, J., Happonen, M., Arnold, F., Rothe, D., Bielaczyc, P., Keskinen, J.
Number of pages: 8
Pages: 2336-2343
Surface modification of thin film composite polyamide membrane using atomic layer deposition method

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Materials Science, Engineering materials science and solutions (EMASS)
Authors: Nikkola, J., Sievänen, J., Raulio, M., Jing, W., Vuorinen, J., Tang Y., C.
Number of pages: 7
Pages: 174-180
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Journal of Membrane Science
Volume: 450
ISSN (Print): 0376-7388
Ratings:
Scopus rating (2016): SJR 2.062 SNIP 1.72 CiteScore 6.13
Scopus rating (2015): SJR 2.071 SNIP 1.771 CiteScore 5.89
Scopus rating (2014): SJR 2.433 SNIP 1.935 CiteScore 5.42
Scopus rating (2013): SJR 2.452 SNIP 2.001 CiteScore 5.38
Scopus rating (2012): SJR 2.201 SNIP 1.968 CiteScore 4.37
Tekstiiliteollisuuden uudet innovaatiot

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Materials Science
Authors: Rissanen, M.
Number of pages: 2
Pages: 12-13
Publication date: 2014
Peer-reviewed: Unknown

Publication information
Journal: Tekstiilehti
Issue number: 5-6
ISSN (Print): 0040-2370
Original language: Finnish

Bibliographical note
Contribution: organisation=mol,FACT1=1
Portfolio EDEND: 2014-12-15
Publisher name: Elsevier
Source: researchoutputwizard
Source-ID: 1147
Research output: Scientific - peer-review › Article

Upgrading landfill gas using a high pressure water absorption process

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Rasi, S., Läntelä, J., Rintala, J.
Number of pages: 5
Pages: 539-543
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Fuel
User Interpretations of Virtual Prototypes: Physical Place Matters

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Kaapu, T., Tiainen, T., Ellman, A.
Number of pages: 22
Pages: 1-22
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Scandinavian Journal of Information Systems
Volume: 25
Issue number: 2
Article number: 4
ISSN (Print): 0905-0167
Ratings:
Scopus rating (2016): CiteScore 0.74 SJR 0.234 SNIP 0.524
Scopus rating (2015): SJR 0.17 SNIP 0.505 CiteScore 0.52
Scopus rating (2014): SJR 0.152 SNIP 0.237 CiteScore 0.5
Scopus rating (2013): SJR 0.117 SNIP 0.523 CiteScore 0.27
Scopus rating (2012): SJR 0.191 SNIP 1.85 CiteScore 0.38
Original language: English
Links:
http://aisel.aisnet.org/sjis/vol25/iss2/4

Bibliographical note
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
Pages: 51-51
Publication date: 2014
Peer-reviewed: No

Publication information
Journal: Vesitalous
Issue number: 1/2014
ISSN (Print): 0505-3838
Original language: Finnish
Links:
http://www.vesitalous.fi/fi/lehtiarkisto-/lehtiarkisto.html

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-12-11
Source: researchoutputwizard
Source-ID: 679
Research output: Scientific › Article

Virtual prototypes reveal more development ideas: comparison between customers' evaluation of virtual and physical prototypes

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Tiainen, T., Ellman, A., Kaapu, T.
Number of pages: 11
Pages: 169-180
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Virtual and Physical Prototyping
Volume: 9
Issue number: 3
ISSN (Print): 1745-2759
Ratings:
Scopus rating (2016): SJR 0.661 SNIP 1.526 CiteScore 3.31
Scopus rating (2015): SJR 0.393 SNIP 0.825 CiteScore 1.23
Scopus rating (2014): SJR 0.477 SNIP 0.978 CiteScore 1.66
Scopus rating (2013): SJR 0.37 SNIP 0.697 CiteScore 1.17
Scopus rating (2012): SJR 0.216 SNIP 0.884 CiteScore 0.71
Scopus rating (2011): SJR 0.236 SNIP 0.669 CiteScore 0.77
Scopus rating (2010): SJR 0.31 SNIP 0.906
Scopus rating (2009): SJR 0.356 SNIP 0.753
Scopus rating (2008): SJR 0.396 SNIP 0.628
Scopus rating (2007): SJR 0.468 SNIP 0.734
Original language: English
DOIs:
Water Hydraulics Pushes Into High-Pressure Systems

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Mechanical Engineering and Industrial Systems
Authors: Koskinen, K. T., Aaltonen, J.
Number of pages: 4
Pages: 84-89
Publication date: 2014
Peer-reviewed: Unknown

Publication information
Journal: Hydraulics & Pneumatics
Volume: 67
Issue number: 2
Original language: English

Water services and cooperation

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., Hukka, J. J., Mashauri, D., Nyangeri, E.
Number of pages: 9
Pages: 231-239
Publication date: 2014

Host publication information
Title of host publication: Global water : issues and insights
Place of publication: Australia
Publisher: ANU Press, Australian National University Press
Editors: Grafton, R. Q., Wynwell, P., White, C., Allendes, D.
ISBN (Print): 978-1925021660
ISBN (Electronic): 978-1925021677
Links:
http://press.anu.edu.au/?p=281381

Bibliographical note
Contribution: organisation=mei,FACT1=1<br/>Portfolio EDEND: 2014-12-03<br/>Publisher name: Taylor & Francis
Source: researchoutputwizard
Source-ID: 1627
Research output: Scientific - peer-review › Article

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-09-17
Source: researchoutputwizard
Source-ID: 680
Research output: Scientific - peer-review › Chapter
Water supply and sanitation services in Finland before World War II is reviewed. In Finland, fire insurance companies played a significant role in the initial development of water services. Water was needed for putting out fires as well as for domestic and other community purposes. At first, Finnish houses were insured, if at all, with the General Fire Insurance Fund in Stockholm. Important social and political reforms such as municipal self-government and universal suffrage also influenced positively the development of the sector. After Finnish cities opted for municipal ownership and responsibility, three other technical options were adopted: metering-based billing, a ban on lead pipes, and the acceptance of flush toilets. Several plans for sewer systems were made and some were also constructed in the late 1800s. Although the wettest areas of the towns were drained and hygiene improved, lakes were still being polluted due to untreated wastewater discharges. The bucket was replaced by a drainpipe, and the problems were flushed out of sight, untreated, to the nearest water systems as is typical of protosystems.

General information
State: Published
Ministry of Education publication type: A2 Review article in a scientific journal
Organisations: Department of Chemistry and Bioengineering, Tampere University of Technology, Life Cycle Effectiveness of the Built Environment (LCE@BE), Former organisation of the author
Authors: Juuti, P., Katko, T.
Number of pages: 8
Pages: 80-87
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Flux
Volume: 97-98
Issue number: 4
ISSN (Print): 1154-2721
Ratings:
Scopus rating (2016): SJR 0.118 SNIP 0.489 CiteScore 0.13
Scopus rating (2015): SJR 0.132 SNIP 0.124 CiteScore 0.16
Scopus rating (2014): SJR 0.138 SNIP 0.594 CiteScore 0.11
Scopus rating (2013): SJR 0.195 SNIP 0.304 CiteScore 0.11
Scopus rating (2012): SJR 0.201 SNIP 0.282 CiteScore 0.07
Scopus rating (2011): SJR 0.185 SNIP 0.308 CiteScore 0.11
Scopus rating (2010): SJR 0.124 SNIP 0.255
Scopus rating (2009): SJR 0.113 SNIP 0.322
Scopus rating (2008): SJR 0.102 SNIP 0.206
Scopus rating (2007): SJR 0.128 SNIP 0.117
Scopus rating (2006): SJR 0.127 SNIP 0.085
Scopus rating (2005): SJR 0.124 SNIP 0.24
Scopus rating (2004): SJR 0.131 SNIP 0.637
Scopus rating (2003): SJR 0.101 SNIP 0
Scopus rating (2001): SJR 0.102 SNIP 0.26
Scopus rating (2000): SJR 0.101 SNIP 0
Scopus rating (1999): SJR 0.106 SNIP 0.122
Original language: English
ASJC Scopus subject areas: Geography, Planning and Development
Links:
http://www.scopus.com/inward/record.url?scp=84926623647&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 84926623647
Research output: Scientific - peer-review › Review Article

Screening pretreatment methods to enhance thermophilic anaerobic digestion of pulp and paper mill wastewater treatment secondary sludge
The effect of hydrothermal (150°C for 10min and 70°C for 40min), enzymatic (Accelerase 1500, 0.07g/g volatile solids (VS)), ultrasound (45kHz for 30min) and chemical pretreatments (HNO₃ at pH3 and NaOH at pH12) alone or in combination on the chemical composition and methane yield of the pulp and paper mill secondary sludge was studied in batch assays at 55°C. In total, 12 different pretreatment combinations were compared. Chemical analyses showed that all pretreatments except for HNO₃ and ultrasound pretreatments improved the organic matter solubilization. Among the studied pretreatments, hydrothermal (150°C, 10min) pretreatment alone or in combination with enzymatic and/or
ultrasound pretreatment had the highest impact on sludge solubilization and methane yield. The increase in methane yield was 31% (from 108ml/g VSoriginal to 141ml/g VSoriginal). In addition, enzymatic pretreatment also improved the methane yields but only when combined with hydrothermal pretreatment at 150°C or ultrasound+hydrothermal pretreatment at 150°C. On the other hand, ultrasound pretreatment did not improve the methane yields while acid and alkaline pretreatments resulted in lower methane yields than control. Improved hydrolysis and higher methane production rates noticed in assays subjected to hydrothermal pretreatment alone or in combination with enzymes and/or ultrasound could make these treatments more attractive in reducing the retention times required during full-scale anaerobic digestion of pulp and paper mill wastewater sludges. © 2013 Elsevier B.V.

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Tampere University of Technology, Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio), Jyväskylä University, University of Jyväskylä
Authors: Bayr, S., Kaparaju, P., Rintala, J.
Number of pages: 8
Pages: 479-486
Publication date: 1 May 2013
Peer-reviewed: Yes

Publication information
Journal: Chemical Engineering Journal
Volume: 223
ISSN (Print): 1385-8947
Ratings:
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
Original language: English
Keywords: Anaerobic digestion, Methane yield, Pretreatment, Pulp and paper mill, Secondary sludge
ASJC Scopus subject areas: Chemical Engineering(all), Chemistry(all), Industrial and Manufacturing Engineering, Environmental Chemistry
DOIs: 10.1016/j.cej.2013.02.119
Links:
http://www.scopus.com/inward/record.url?scp=84876300888&partnerID=8YFLogxK (Link to publication in Scopus)

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>
Portfolio EDEND: 2013-11-29<br/>
Publisher name: Elsevier BV
Source: researchoutputwizard
Source-ID: 1974
Research output: Scientific - peer-review › Article

Anaerobic conversion of microalgal biomass to sustainable energy carriers - A review

General information
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
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

Case study on sampling, processing and characterization of landfilled municipal solid waste in the view of landfill mining

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Kaartinen, T., Sormunen, K., Rintala, J.
Number of pages: 12
Pages: 56-66
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Journal of Cleaner Production
Volume: 55
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
Co-fermentation of water hyacinth and beverage wastewater in powder and pellet form for hydrogen production

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Lay, C., Sen, B., Chen, C., Wu, J., Lee, S., Lin, C.
Number of pages: 6
Pages: 610-615
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Bioresource Technology
Volume: 135
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
DOIs:
10.1016/j.biortech.2012.06.094

Bibliographical note
Contribution: organisation=keb,FACT1=1\>Portfolio EDEND: 2013-12-29\>Publisher name: Elsevier
Source: researchoutputwizard
Culturable psychrotolerant methanotrophic bacteria in landfill cover soil

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Kallistova, A. Y., Montonen, L., Jurgens, G., Münster, U., Kevbrina, M. V., Nozhevnikova, A. N.
Number of pages: 8
Pages: 847-855
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Microbiology
Volume: 82
Issue number: 6
ISSN (Print): 0026-2617
Ratings:
Scopus rating (2016): SJR 0.302 SNIP 0.559 CiteScore 0.82
Scopus rating (2015): SJR 0.349 SNIP 0.558 CiteScore 0.79
Scopus rating (2014): SJR 0.272 SNIP 0.386 CiteScore 0.6
Scopus rating (2013): SJR 0.32 SNIP 0.592 CiteScore 0.72
Scopus rating (2012): SJR 0.345 SNIP 0.48 CiteScore 0.63
Scopus rating (2011): SJR 0.282 SNIP 0.476 CiteScore 0.58
Scopus rating (2010): SJR 0.294 SNIP 0.428
Scopus rating (2009): SJR 0.308 SNIP 0.569
Scopus rating (2008): SJR 0.271 SNIP 0.496
Scopus rating (2007): SJR 0.225 SNIP 0.306
Scopus rating (2006): SJR 0.212 SNIP 0.342
Scopus rating (2005): SJR 0.183 SNIP 0.234
Scopus rating (2004): SJR 0.155 SNIP 0.174
Scopus rating (2003): SJR 0.136 SNIP 0.079
Scopus rating (2002): SJR 0.165 SNIP 0.189
Scopus rating (2001): SJR 0.198 SNIP 0.205
Scopus rating (2000): SJR 0.211 SNIP 0.259
Scopus rating (1999): SJR 0.244 SNIP 0.365
Original language: English
DOIs:
10.1134/S0026261714010044

Bibliographical note
Source: researchoutputwizard
Source-ID: 2479
Research output: Scientific - peer-review › Article

Dags att syna utmaningarna inom vattenförsörjningen

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: 2
Pages: 30-31
Determination of waste decay rate for a large Finnish landfill by calibrating methane generation models on the basis of methane recovery and emissions

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Sormunen, K., Laurila, T., Rintala, J.
Number of pages: 7
Pages: 979-985
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Waste Management and Research
Volume: 31
Issue number: 10
ISSN (Print): 0734-242X
Ratings:
Scopus rating (2016): SJR 0.655 SNIP 1.036 CiteScore 1.76
Scopus rating (2015): SJR 0.617 SNIP 0.899 CiteScore 1.53
Scopus rating (2014): SJR 0.741 SNIP 1.085 CiteScore 1.28
Scopus rating (2013): SJR 0.588 SNIP 0.951 CiteScore 1.17
Scopus rating (2012): SJR 0.886 SNIP 1.046 CiteScore 1.4
Scopus rating (2011): SJR 1.027 SNIP 0.865 CiteScore 1.33
Scopus rating (2010): SJR 0.666 SNIP 0.975
Scopus rating (2009): SJR 0.877 SNIP 1.257
Scopus rating (2008): SJR 0.49 SNIP 0.933
Scopus rating (2007): SJR 0.352 SNIP 0.666
Scopus rating (2006): SJR 0.295 SNIP 0.755
Scopus rating (2005): SJR 0.449 SNIP 0.729
Scopus rating (2004): SJR 0.48 SNIP 0.787
Scopus rating (2003): SJR 0.626 SNIP 0.831
Scopus rating (2002): SJR 0.465 SNIP 0.707
Scopus rating (2001): SJR 0.691 SNIP 1.118
Scopus rating (2000): SJR 0.582 SNIP 0.879
Scopus rating (1999): SJR 0.579 SNIP 0.877
Original language: English
DOIs:
10.1177/0734242X13490980

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-07-29<br/>Publisher name: Sage Publications
Source: researchoutputwizard
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
Source: researchoutputwizard
Source-ID: 2525
Research output: Scientific - peer-review › Chapter

Distribution of dehalogenation activity in subseafloor sediments of the Nankai Trough subduction zone

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Futagami, T., Morono, Y., Terada, T., Kaksonen, A. H., Inagaki, F.
Number of pages: 15
Pages: 1-15
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Philosophical Transactions of the Royal Society B: Biological Sciences
Volume: 368
Issue number: 1616
Article number: 20120249
ISSN (Print): 0962-8436
Ratings:
Scopus rating (2016): SJR 2.137 SNIP 1.137 CiteScore 3.61
Scopus rating (2015): SJR 2.573 SNIP 1.379 CiteScore 4.03
Scopus rating (2014): SJR 3.022 SNIP 1.873 CiteScore 4.82
Scopus rating (2013): SJR 3.747 SNIP 2.203 CiteScore 6.77
Scopus rating (2012): SJR 3.509 SNIP 2.253 CiteScore 6.52
Scopus rating (2011): SJR 3.728 SNIP 2.212 CiteScore 6.35
Scopus rating (2010): SJR 3.195 SNIP 1.836
Scopus rating (2009): SJR 3.258 SNIP 1.645
Scopus rating (2007): SJR 3.214 SNIP 1.767
Scopus rating (2006): SJR 2.67 SNIP 1.688
Scopus rating (2005): SJR 3.13 SNIP 1.511
Scopus rating (2004): SJR 2.771 SNIP 1.285
Scopus rating (2003): SJR 2.32 SNIP 1.179
Scopus rating (2002): SJR 2.042 SNIP 1.091
Scopus rating (2001): SJR 2.264 SNIP 1.24
Diversity of the water supply and sanitation sector: roles of municipalities in Europe

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: Pietilä, P.
Number of pages: 13
Pages: 99-111
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

Epilogue

General information
State: Published
Ministry of Education publication type: C2 Edited books
Organisations: Department of Chemistry and Bioengineering, Former organisation of the author
Number of pages: 5
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

Fluidized-bed denitrification for mine waters. Part I: low pH and temperature operation

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Gestão e organização dos serviços 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.
Pages: 135-155
Publication date: 2013

Host publication information
Title of host publication: Política publica e gestão de serviços de saneamento
Place of publication: Belo Horizonte; Rio de Janeiro
Publisher: Editora da Universidade Federal de Minas Gerais (UFMG); Editora Fiocruz
Editors: Heller, L., Esteban Castro, J.
ISBN (Print): 978-85-7041-953-8

Bibliographical note
Política Pública e Gestão de Serviços de Saneamento (Public Policy and Management of Water and Sanitation Services)<br/>Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-11-29
Source: researchoutputwizard
Source-ID: 3400
Research output: Scientific - peer-review › Chapter

Haipea eli hyvä - minkälaisia merkityksiä vesihuoltoala rakentaa itsestään

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering
Authors: Heino, O., Takala, A.
Pages: 226-245
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Kunnallistieteellinen Aikakirja
Volume: 41
Issue number: 3
ISSN (Print): 0356-3669
Original language: Finnish

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2014-12-12<br/>Publisher name: Kunnallistieteiden yhdistys
Source: researchoutputwizard
Source-ID: 2275
Research output: Scientific - peer-review › Article

Hanaa!: Suomen vesihuolto - kehitys ja yhteiskunnallinen merkitys

General information
State: Published
Ministry of Education publication type: C1 Separate scientific books
Organisations: Department of Chemistry and Bioengineering
Authors: Katko, T. S.
Number of pages: 501
Publication date: 2013

Publication information
Place of publication: Helsinki
Publisher: Suomen Vesilaitosyhdistys ry
ISBN (Print): 978-952-5000-97-9
Heat stress adaptation induces cross-protection against lethal acid stress conditions in Arcobacter butzleri but not in Campylobacter jejuni

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Signal Processing, Department of Chemistry and Bioengineering
Authors: Isohanni, P., Huehn, S., Aho, T., Alter, T., Lyhs, U.
Number of pages: 5
Pages: 431-435
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Food Microbiology
Volume: 34
Issue number: 2
ISSN (Print): 0740-0020
Ratings:
Scopus rating (2016): CiteScore 4.31 SJR 1.702 SNIP 1.695
Scopus rating (2015): SJR 1.714 SNIP 1.776 CiteScore 4.24
Scopus rating (2014): SJR 1.548 SNIP 1.755 CiteScore 3.74
Scopus rating (2013): SJR 1.759 SNIP 1.85 CiteScore 3.81
Scopus rating (2012): SJR 1.618 SNIP 1.647 CiteScore 3.54
Scopus rating (2011): SJR 1.578 SNIP 1.885 CiteScore 3.72
Scopus rating (2010): SJR 1.669 SNIP 1.765
Scopus rating (2009): SJR 1.574 SNIP 1.736
Scopus rating (2008): SJR 1.268 SNIP 1.591
Scopus rating (2007): SJR 1.032 SNIP 1.703
Scopus rating (2006): SJR 1.064 SNIP 1.626
Scopus rating (2005): SJR 0.899 SNIP 1.166
Scopus rating (2004): SJR 0.774 SNIP 1.041
Scopus rating (2003): SJR 0.7 SNIP 0.911
Scopus rating (2002): SJR 0.689 SNIP 0.962
Scopus rating (2001): SJR 0.757 SNIP 1.066
Scopus rating (2000): SJR 0.801 SNIP 1.106
Scopus rating (1999): SJR 0.793 SNIP 0.968
Original language: English
DOIs:
10.1016/j.fm.2013.02.001

Bibliographical note
Contribution: organisation=keb,FACT1=0.5<br/>
Publisher name: Elsevier Ltd.
Source: researchoutputwizard
Source-ID: 2381
Research output: Scientific - peer-review › Article

Heikot signaalit vesihuollossa
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
DOI: 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
Source-ID: 3792
Research output: Scientific - peer-review › Article
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
Source-ID: 2524
Research output: Scientific - peer-review › Chapter

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
Peer-reviewed: Unknown

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., Sittenen, P., Heino, O.
Number of pages: 15
Pages: 99-113
Publication date: 2013

Host publication information
Title of host publication: Markkinainnovaatiot yhdyskuntajätehuollossa: tutkimus jätehuoltopalvelujen markkinoiden evoluutiossa, sovelluksista ja jännitteistä kunnallisen ja yksityisen sektorin rajapinnassa
Place of publication: Tampere
Kivihiilen ja puupelletin seospoltto energiantuotannossa

General information
State: Published
Ministry of Education publication type: D1 Article in a trade journal
Organisations: Department of Automation Science and Engineering
Authors: Rantsi, J., Judl, J., Koskela, S., Karvosenoja, N., Korpela, T.
Number of pages: 3
Pages: 4-6
Publication date: 2013
Peer-reviewed: Unknown

Publication information
Journal: Ilmansuojelu
Issue number: 4
Original language: Finnish
Links:

Bibliographical note
Contribution: organisation=ase,FACT1=1<br/>Portfolio EDEND: 2013-12-29<br/>Publisher name: Ilmansuojeluyhdistys ry
Source: researchoutputwizard
Source-ID: 3231
Research output: Professional › Article

Kyläyhteisöt palvelutuotantoedellytyksistä 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
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., Haghdooost, 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
DOIs:
10.1155/2013/209739

Bibliographical note
Contribution: organisation=keb,FACT1=1
Publisher name: Hindawi

Profiling of bacterial community in a full-scale aerobic composting plant

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Karadag, D., Özkaya, B., Ölmez, E., Nissilä, M. E., CakmakCl, M., Yıldız, S., Puhakka, J. A.
Number of pages: 6
Pages: 85-90
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: International Biodeterioration and Biodegradation
Volume: 77
ISSN (Print): 0964-8305
Ratings:
Scopus rating (2016): SJR 1.033 SNIP 1.555 CiteScore 3.38
Scopus rating (2015): SJR 0.899 SNIP 1.326 CiteScore 2.71
Scopus rating (2014): SJR 0.881 SNIP 1.389 CiteScore 2.53
Scopus rating (2013): SJR 0.873 SNIP 1.449 CiteScore 2.51
Päätelmät yhdyskuntajätehuollon 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 yhdyskuntajätehuollossa : 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
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
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: Vuorinen, H. S., Juuti, P. S., Katko, T. S.
Number of pages: 7
Pages: 89-96
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
Portfolio EDEND: 2013-09-29
Source: researchoutputwizard
Source-ID: 3724
Research output: Scientific - peer-review › Chapter
Host publication information
Title of host publication: Huomispäivän infrastruktuuri. Kuntaliiton verkkojulkaisu. Acta 240
Publisher: Suomen Kuntaliitto
Editors: Malinen, P., Anttiroiko, A., Haahtela, T., Siitonen, P.
ISBN (Print): 978-952-213-915-3
ISBN (Electronic): 978-952-213-916-0
Links:

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-07-29
Source: researchoutputwizard
Source-ID: 2271
Research output: Scientific - peer-review › Chapter

Tutkimuksen teoreettinen viitekehys

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., Kallio, O., Heino, O.
Number of pages: 17
Pages: 16-32
Publication date: 2013

Host publication information
Title of host publication: Markkinainnovaatiot yhdyskuntajätehuollossa : tutkimus jätehuoltopalvelujen markkinoiden evoluuionsa, 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: 3636
Research output: Scientific - peer-review › Chapter

Vanhuus uhkaa vesihuoltoa

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: 1
Pages: B16-B16
Publication date: 2013
Peer-reviewed: Unknown

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

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-12-29
Source: researchoutputwizard
Source-ID: 2519
Research output: General public › Article
**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<br/>Portfolio EDEND: 2013-11-29
Source: researchoutputwizard
Source-ID: 2522
Research output: Professional › Article

**Vesihuollossa muhil alkamommi**

**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<br/>Portfolio EDEND: 2014-02-15<br/>Publisher name: Otavamedia
Source: researchoutputwizard
Source-ID: 2517
Research output: General public › Article

**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

**Publication information**
Journal: RY Rakennettu ympäristö
Volume: 50
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
Original language: Finnish
Links:

Bibliographical note
Contribution: organisation=keb,FACT1=1<br/>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
Contribution: organisation=keb,FACT1=1<br/>Portfolio EDEND: 2013-06-29
Source: researchoutputwizard
Source-ID: 2936
Energy Demands of Nitrogen Supply in Mass Cultivation of Two Commercially Important Microalgal Species, Chlorella vulgaris and Dunaliella tertiolecta

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Chemistry and Bioengineering, Urban circular bioeconomy (UrCirBio)
Authors: Hulatt, C. J., Lakaniemi, A., Puhakka, J. A., Thomas, D. N.
Pages: 669-684
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: BioEnergy Research
Volume: 5
Issue number: 3
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/s12155-011-9175-x

Bibliographical note
Contribution: organisation=keb bio,FACT1=1<br/>Publisher name: Springer-Verlag
Source: researchoutputwizard
Source-ID: 4239
Biogenic hydrogen and methane production from Chlorella vulgaris and Dunaliella tertiolecta biomass

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., Hulatt, C. J., Thomas, D. N., Tuovinen, O. H., Puhakka, J. A.
Number of pages: 12
Pages: 1-12
Publication date: 2011
Peer-reviewed: Yes

Publication information
Journal: Biotechnology for Biofuels
Volume: 4
Issue number: 1
Article number: 34
ISSN (Print): 1754-6834
Ratings:
Scopus rating (2016): SJR 1.969 SNIP 1.65 CiteScore 5.89
Scopus rating (2015): SJR 2.409 SNIP 1.89 CiteScore 6.79
Scopus rating (2014): SJR 2.414 SNIP 1.722 CiteScore 5.86
Scopus rating (2013): SJR 2.17 SNIP 1.815 CiteScore 6.21
Scopus rating (2012): SJR 2.15 SNIP 1.849 CiteScore 5.7
Scopus rating (2011): SJR 2.249 SNIP 2.168 CiteScore 6.1
Scopus rating (2010): SJR 1.774 SNIP 1.745
Scopus rating (2009): SJR 1.317 SNIP 1.74
Original language: English
DOIs:
10.1186/1754-6834-4-34

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 6540
Research output: Scientific - peer-review › Article
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): SJR 1.188 SNIP 1.368 CiteScore 3.71
- 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.2010.10.032

Bibliographical note
Contribution: organisation=keb bio,FACT1=1
Source: researchoutputwizard
Source-ID: 6541
Research output: Scientific - peer-review › Article

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
Journal: Bioresource Technology
Volume: 101
Issue number: 11
Uniqueness of water services

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Research group: Industrial Bioengineering and Applied Organic Chemistry, Department of Chemistry and Bioengineering
Authors: Pietilä, P. E., Katko, T. S., Seppälä, O.
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: E-Water
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
Links:
http://www.ewaonline.de/portale/ewa/ewa.nsf/home?readform&objectid=7BEE56D63E38CEBDC1257727002F494A
Research output: Scientific - peer-review › Article
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

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 14835
Research output: Scientific - peer-review › Article

Field-scale assessment of phytotreatment of soil contaminated with weathered hydrocarbons and heavy metals

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Bio- ja ympäristötöekniikka
Authors: Palmroth, M., Koskinen, P., Pichtel, J., Vaajasaari, K., Joutti, A., Tuhkanen, T., Puhakka, J.
Pages: 128-136
Publication date: 2006
Peer-reviewed: Yes

Publication information
Journal: Journal of Soils & Sediments
Volume: 6
Issue number: 3
Original language: English
DOIs:
10.1065/jss2006.07.170

Bibliographical note
Contribution: organisation=bio,FACT1=1
Source: researchoutputwizard
Source-ID: 17283
Research output: Scientific - peer-review › Article
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.