

Characterisation of novel regenerated cellulosic, viscose, and cotton fibres and the dyeing properties of fabrics

There is a global demand for constant increase in the production of textile fibres. Currently, the market for cellulosic fibres is dominated by cotton and viscose fibres. However, new alternative cellulosic fibres are being sought to meet the growing demand. The dyeing properties of novel fibres aiming at the marketplace are among the properties that determine their applicability to textiles. Recently, a novel process for producing cellulosic fibres, the Biocelsol process, has been scaled up so that the spinning of yarn from Biocelsol fibres is now possible. In this study, the reactive dye Levafix CA Blue was applied to cellulosic fabrics made from viscose, cotton, and Biocelsol yarns. The crystalline structure and morphology of the fibres were studied by Fourier transform infrared spectroscopy and field-emission scanning electron microscopy. The crystalline structure and morphology of the Biocelsol fibres resembled those of viscose fibres, but, owing to higher water absorption, the Biocelsol fabric had a higher dye exhaustion. The colour yield of the Biocelsol fabric was 62% and 41% higher than that of cotton and viscose fabrics respectively, suggesting that less dye is needed to gain a shade in Biocelsol fabric than in viscose and cotton fabrics.

General information

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MoE publication type: A1 Journal article-refereed

Organisations: Department of Materials Science, Research group: Fibre Materials, Research group: Materials Characterization, Engineering materials science and solutions (EMASS)

Contributors: Kamppuri, T., Vehviläinen, M., Puolakka, A., Honkanen, M., Vippola, M., Rissanen, M.

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ASJC Scopus subject areas: Chemistry (miscellaneous), Chemical Engineering(all), Materials Science (miscellaneous)

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Research output: Contribution to journal > Article > Scientific > peer-review

Metabolic profiling of water-soluble compounds from the extracts of dark septate endophytic fungi (DSE) isolated from scots pine (*Pinus sylvestris* L.) seedlings using UPLC–orbitrap–MS

Endophytes are microorganisms living inside plant hosts and are known to be beneficial for the host plant vitality. In this study, we isolated three endophytic fungus species from the roots of Scots pine seedlings growing on Finnish drained peatland setting. The isolated fungi belonged to dark septate endophytes (DSE). The metabolic profiles of the hot water extracts of the fungi were investigated using Ultrahigh Performance Liquid Chromatography with Diode Array Detection and Electron Spray Ionization source Mass Spectrometry with Orbitrap analyzer (UPLC–DAD–ESI–MS–Orbitrap). Out of 318 metabolites, we were able to identify 220, of which a majority was amino acids and peptides. Additionally, opine amino acids, amino acid quinones, Amadori compounds, cholines, nucleobases, nucleosides, nucleotides, siderophores, sugars, sugar alcohols and disaccharides were found, as well as other previously reported metabolites from plants or endophytes. Some differences of the metabolic profiles, regarding the amount and identity of the found metabolites, were observed even though the fungi were isolated from the same host. Many of the discovered metabolites have been described possessing biological activities and properties, which may make a favorable contribution to the host plant nutrient availability or abiotic and biotic stress tolerance.

General information

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Organisations: Materials Science and Environmental Engineering, Research group: Bio- and Circular Economy, Natural Resources Institute Finland (Luke), Turku University of Applied Science, University of Helsinki, School of Chemical Engineering, Aalto University

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Keywords: *Acephala applanata*, *Coniochaeta mutabilis*, Endophytes, Endophytic fungi, *Humicolopsis cephalosporioides*, Metabolites, Peptides, *Phialocephala fortinii*, Scots pine, UPLC–MS

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MetrIntSimil—an accurate and robust metric for comparison of similarity in intelligence of any number of cooperative multiagent systems

Intelligent cooperative multiagent systems are applied for solving a large range of real-life problems, including in domains like biology and healthcare. There are very few metrics able to make an effective measure of the machine intelligence quotient. The most important drawbacks of the designed metrics presented in the scientific literature consist in the limitation in universality, accuracy, and robustness. In this paper, we propose a novel universal metric called MetrIntSimil capable of making an accurate and robust symmetric comparison of the similarity in intelligence of any number of cooperative multiagent systems specialized in difficult problem solving. The universality is an important necessary property based on the large variety of designed intelligent systems. MetrIntSimil makes a comparison by taking into consideration the variability in intelligence in the problem solving of the compared cooperativemultiagent systems. It allows a classification of the cooperativemultiagent systems based on their similarity in intelligence. A cooperative multiagent system has variability in the problem solving intelligence, and it can manifest lower or higher intelligence in different problem solving tasks. More cooperative multiagent systems with similar intelligence can be included in the same class. For the evaluation of the proposed metric, we conducted a case study for more intelligent cooperative multiagent systems composed of simple computing agents applied for solving the Symmetric Travelling Salesman Problem (STSP) that is a class of NP-hard problems. STSP is the problem of finding the shortest Hamiltonian cycle/tour in a weighted undirected graph that does not have loops or multiple edges. The distance between two cities is the same in each opposite direction. Two classes of similar intelligence denoted IntClassA and IntClassB were identified. The experimental results show that the agent belonging to IntClassA intelligence class is less intelligent than the agents that belong to the IntClassB intelligence class.

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MoE publication type: A1 Journal article-refereed

Organisations: Research group: Computational Medicine and Statistical Learning Laboratory (CMSL), Faculty of Biomedical Sciences and Engineering, Research group: Predictive Society and Data Analytics (PSDA), Petru Maior University, University of Applied Sciences Upper Austria, Nankai University, Institute for Bioinformatics and Translational Research

Contributors: Iantovics, L. B., Dehmer, M., Emmert-Streib, F.

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Original language: English

ASJC Scopus subject areas: Computer Science (miscellaneous), Chemistry (miscellaneous), Mathematics(all), Physics and Astronomy (miscellaneous)

Keywords: Computational-hard problem, Cooperative problem solving, Diversity of intelligent systems, Machine intelligence measure, Similarity in intelligence, Symmetric travelling salesman problem

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Solid-phase bromination and Suzuki coupling of 2-carboxyindoles

As part of an ongoing lead discovery project we have developed a convenient method for the modification and substitution of indole moieties at the 3-position. Selective bromination of three different 2-carboxyindoles was followed by Suzuki cross-coupling with aryl and heteroaryl boronic acids on a Merrifield resin solid-phase. After column chromatography, yields of the 3- substituted indoles ranged from 42-98%.

General information

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Organisations: University of Helsinki, Department of Pharmacy

Contributors: Tois, J., Franzén, R., Aitio, O., Laakso, I., Huuskonen, J., Taskinen, J.

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Publication information

Journal: Combinatorial Chemistry and High Throughput Screening

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Scopus rating (2001): SJR 0.78 SNIP 0.872

Original language: English

ASJC Scopus subject areas: Clinical Biochemistry, Chemistry (miscellaneous), Pharmacology

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Research output: Contribution to journal > Article > Scientific > peer-review

Synthesis of 6,12-disubstituted methanodibenzo[b,f][1,5]dioxocins: Pyrrolidine catalyzed self-condensation of 2'-Hydroxyacetophenones

The preparation of unprecedented 6,12-disubstituted methanodibenzo[b,f][1,5]dioxocins from pyrrolidine catalyzed self-condensation of 2'-hydroxyacetophenones is herein described. This method provides easy access to this highly bridged complex core, resulting in construction of two C-O and two C-C bonds, a methylene bridge and two quaternary centers in a single step. The intricate methanodibenzo[b,f][1,5]dioxocin compounds were obtained in up to moderate yields after optimization of the reaction conditions concerning solvent, reaction times and the use of additives. Several halide substituted methanodibenzo[b,f][1,5]dioxocins could be prepared from correspondent 2'-hydroxyacetophenones.

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Organisations: Materials Science and Environmental Engineering, Faculdade de Farmacia da Universidade de Lisboa, University of Jyväskylä
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ASJC Scopus subject areas: Analytical Chemistry, Chemistry (miscellaneous), Molecular Medicine, Pharmaceutical Science, Drug Discovery, Physical and Theoretical Chemistry, Organic Chemistry

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EXT="Valkonen, Arto"

INT=msee,"Riihonen, Vesa"

INT=msee,"Vale, João R."

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The Hosoya entropy of graphs revisited

In this paper we extend earlier results on Hosoya entropy (H-entropy) of graphs, and establish connections between H-entropy and automorphisms of graphs. In particular, we determine the H-entropy of graphs whose automorphism group has exactly two orbits, and characterize some classes of graphs with zero H-entropy.

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Organisations: Research group: Computational Medicine and Statistical Learning Laboratory (CMSL), Computing Sciences, Research group: Predictive Society and Data Analytics (PSDA), Shahid Rajaei Teacher Training University, University of Applied Sciences Upper Austria, School of Management, Hall in Tyrol, Nankai University, The City College of New York (CUNY), Aalto University, Peking University

Contributors: Ghorbani, M., Dehmer, M., Mowshowitz, A., Tao, J., Emmert-Streib, F.

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Original language: English

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Keywords: Automorphism of graphs, Graph entropy, Graph products

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Research output: Contribution to journal > Article > Scientific > peer-review

The maximum Hosoya index of unicyclic graphs with diameter at most four

The Hosoya index of a graph is defined by the total number of the matchings of the graph. In this paper, we determine the maximum Hosoya index of unicyclic graphs with n vertices and diameter 3 or 4. Our results somewhat answer a question proposed by Wagner and Gutman in 2010 for unicyclic graphs with small diameter.

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Organisations: Computing Sciences, Research group: Computational Medicine and Statistical Learning Laboratory (CMSL), Research group: Predictive Society and Data Analytics (PSDA), Central South University China, Shandong Normal University, University of Applied Sciences Upper Austria, School of Management, Department of Biomedical Computer Science and Mechatronics UMIT, Nankai University

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Original language: English

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Keywords: Diameter, Hosoya index, Unicyclic graphs

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The role of symmetry in the aesthetics of residential building façades using cognitive science methods

Symmetry is an important visual feature for humans and its application in architecture is completely evident. This paper aims to investigate the role of symmetry in the aesthetics judgment of residential building façades and study the pattern of eye movement based on the expertise of subjects in architecture. In order to implement this in the present paper, we have created images in two categories: symmetrical and asymmetrical façade images. The experiment design allows us to investigate the preference of subjects and their reaction time to decide about presented images as well as record their eye movements. It was inferred that the aesthetic experience of a building façade is influenced by the expertise of the subjects. There is a significant difference between experts and non-experts in all conditions, and symmetrical façades are in line with the taste of non-expert subjects. Moreover, the patterns of fixational eye movements indicate that the horizontal or vertical symmetry (mirror symmetry) has a profound influence on the observer's attention, but there is a difference in the points watched and their fixation duration. Thus, although symmetry may attract the same attention during eye movements on façade images, it does not necessarily lead to the same preference between the expert and non-expert groups.

General information

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Organisations: Computing Sciences, Research group: Predictive Society and Data Analytics (PSDA), Research group: Computational Medicine and Statistical Learning Laboratory (CMSL), Shahid Rajaei Teacher Training University, Swiss Distance University of Applied Sciences

Contributors: Azemati, H., Jam, F., Ghorbani, M., Dehmer, M., Ebrahimpour, R., Ghanbaran, A., Emmert-Streib, F.
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