

Structuring of cellulose (nano) substrates into functional porous materials

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Abstract:

Cellulose fibres offer themselves as an efficient platform for development of bio-based porous matrices, which can target numerous applications. Either exploiting their supramolecular arrangement of organized fibrillar stacks within the fibre bulk for the preparation of a porous platform or breaking down its hierarchical and multi-level organization to prepare different kinds of nanoscaled cellulosic substrates, cellulose substrates offer a myriad of possibilities. In the presented study, these two approaches will be tackled; (i) activation procedures for enhancement of cellulose fibres' accessibility and reactivity through opening and widening of voids on the surface and internal pores, by disrupting fibrillar aggregates and thus forming additional available surface and (ii) employing different nanocellulosic building blocks to create new materials through templating, with special attention given to fabrication of aerogels with controlled porosity. Mechanisms of cellulose fibre swelling and its subsequent influence on the activation of pore system will be elaborated upon and strategies for structuring of nanocellulosic substrates, towards obtaining functional porous matrices, will be presented. Morphological, structural and chemical properties of modified fibres and newly formed structures were extensively characterized.

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Biography:

Silvo Hribernik works as a Scientific Associate at the Faculty of Mechanical Engineering, University of Maribor. He finished his graduate study in 2005 in the field of eco-textile engineering and doctoral study in 2010 in the field of textile technology, both conducted at

the Faculty of Mechanical Engineering in Maribor, Slovenia. During this time, he also performed research work as a visiting scientist at Institute of Chemistry in Ljubljana and at the Fraunhofer Institute in Potsdam, Germany. Main area of his research is development of fibre-based functional materials with implementation of nanotechnology and is comprised of several research interests; study of materials' structure; synthesis of nano-particles, with special attention to magnetic and conductive particles; study and development of coating and adsorption processes.

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