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Press release

Defense on 8/10/2021

Simplified preparation of cellulose nanocrystals and applications thereof

Title of the doctoral thesis	Cellulose nanocrystals: insights into the preparation and incorporation into new materials templates.
Content of the doctoral thesis	Natural polymers are topical materials in applications ranging from food industry, adhesives and paper to advanced drug delivery. Cellulose nanocrystals derived from cellulose fibers, have gained increased attention in materials science community due to their outstanding mechanical, optical and rheological properties, with specific applications within sustainable materials and energy solutions. However, the isolation of cellulose nanocrystals out of the fiber matrix via an efficient, circular, and otherwise environmentally friendly procedure still remains a challenge. In this thesis, we have tried to optimize the already known cellulose hydrolysis with hydrogen chloride gas by developing a gas phase reactor that can efficiently isolate nanocrystals out of the fiber structure. The reactor was also utilized in a fundamental effort with thin films that visually revealed intermediate stages of the hydrolysis. In additional efforts, micrometer sized porous particles of oriented cellulose nanocrystals were prepared, and single nanocrystals were incorporated as layers between zinc oxide nanolaminates which exhibited strongly reduced thermal conductivity. These are fundamental materials templates that have potential use in, for example, reinforcing materials in biomedical composites or thermoelectric materials.
Field of the doctoral thesis	Bioproducts
Doctoral candidate and contact information	M.Sc. (Tech.) Panagiotis Spiliopoulos panspi@chalmers.se
Defence date and time	08 October 2021 at 12 o'clock **Remote**
defence	https://aalto.zoom.us/j/64004385532
Place of defence	Aalto University School of Chemical Engineering, Circular Raw Materials Hub, lecture hall Aluminium, Vuorimiehentie 2, Espoo
Opponent(s)	Professor Henrikki Ville Liimatainen, University of Oulu, Finland
Custos	Professor Eero Kontturi, Aalto University School of Chemical Engineering
Link to electronic thesis	https://aaltodoc.aalto.fi/handle/123456789/51
Keywords	Cellulose nanocrystlas, HCl (g) hydrolysis, crosslinking, hybrids

Dissertation will be on public display at https://aaltodoc.aalto.fi/doc_public/eonly/riiputus/