



Bio-based nanostructured materials for the control of surface properties

Master thesis at Applied Chemistry Division

Background

Cellulose, which is a building material in trees and plants, is the most available raw material on the Earth. Its use in high value-added applications is nowadays a growing field, which has been enabled by the latest development of nanocelluloses. Due to negative surface charge, which comes from the presence of hemicelluloses or is introduced by chemical surface modification during the production process, nanocellulose has a great potential for use in combination with positively charged polymers. Such nanocellulose-polymer complexes can be further reinforced by negatively charged silica nanoparticles. Using such an approach we can build a platform for altering surface properties of various materials.

Objectives

The aim of this project is the production of advanced materials from lignocellulosic substrates using coatings of nanocellulose and nanosilica. The focus will be made on investigation of the influence of plasticizers, binders and cross-linkers on the ensuing coating properties and on the adhesion forces between coating and a substrate. This project includes:

- Literature review;
- Development of coating formulations, their application;
- Characterization (AFM, UV/vis, contact angle, tensile testing, DLS *etc.*);
- Processing of experimental data;
- Reporting.

Requirements

- Preferred background in materials science, surface chemistry, chemistry or chemical engineering;
- Strong interest in being a part of an active research team.

Additional information:

Duration: 20/40 weeks (30/60 ECTS). The thesis will be performed at the division of Applied Chemistry, department of Chemistry and Chemical Engineering. This work will contribute to the NanoRestArt (Horizon 2020 EU) project performed at Chalmers University of Technology in close connection with AkzoNobel.

Contacts

This Master thesis will be performed under supervision of Oleksandr Nechyporchuk and co-supervision of Krzysztof Kolman and Romain Bordes. Please, send your application to Oleksandr or other supervisors if you are interested.



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