

Karoliina Junka

Aalto University, School of Chemical Technology

Department of Forest Products Technology

karoliina.junka@tkk.fi



Surface interactions and functionalities of polysaccharide-cellulose systems

One of the main focus areas of the research program of the forest products surface chemistry group at Aalto University is related to surface phenomena in cellulosic systems. We have a long-term tradition to measure surface forces and adsorption characteristics in cellulose, hemicellulose and lignin-based systems.

The aim of this PhD work is to study the surface interactions and functionalities of cellulose-polysaccharide systems. Some polysaccharides are known to have natural ability to adsorb irreversibly on cellulose. This property could be utilized in surface modification of cellulose in aqueous media. The fundamental knowledge gained from this research can be used for the development of totally biomass-based materials with different kinds of functionalities, which can be used in applications such as filters, paper, composites and biomedical applications. Main methods used in this work are quartz crystal microbalance with dissipation (QCM-D), atomic force microscopy (AFM) and colloidal probe microscopy (CPM). So far a comparative study about the adsorption of different cellulose-like polysaccharides on cellulose model surfaces has been done using QCM-D, AFM and surface plasmon resonance (SPR). Also, multilayers (PEM) of cellulose derivatives and chitosan on cellulose model surfaces have been studied using QCM-D and CPM.