

Eye imaging technology provides opportunities in biotechnology

August 5 2019



In her doctoral dissertation, M.Sc. Sanna Haavisto, researched the flow properties of aqueous microcellulose suspensions. Credit: University of Jyväskylä

In her doctoral dissertation, M.Sc. Sanna Haavisto, researched the flow properties of aqueous microcellulose suspensions. Optical coherence tomography, an imaging technology commonly used in medical imaging

of eye, was applied in a novel way in her study. The measurement methods developed in the doctoral thesis can also be utilized in developing the material properties of microfibrillated celluloses, e.g in textile innovations.

Microfibrillated [cellulose](#) is made by grinding [cellulose fibers](#) into a finely divided material in the micrometer range. An even finer material of microfibrillated cellulose is nanofibrillated cellulose. With various processing techniques, micro- and nanofibrillated cellulose can be made into both very hard and flexible, transparent and translucent materials.

As potential ingredients for novel bio-based materials and high-end products, micro- and nanofibrillated celluloses are considered one of the most promising materials in the bioeconomy. One of the applications awaiting a breakthrough is textile fibers, that are produced using such micro- or nanocellulosic materials. Currently, there are several textile innovations in Finland that are based on pulp and paper excellence.

In industrial scale applications, it is important that the material and flow properties of the raw material are properly understood. Aqueous suspensions of microfibrillated cellulose are very complex and, to date, especially poorly known for their flow properties. According to Sanna Haavisto, this is due to the limited availability of suitable measurement methods.

The measurement methods can also be utilized in developing the material properties of microfibrillated celluloses

Haavisto's doctoral dissertation shows how the fine structure of microfibrillated cellulose as well as their complex flow phenomena can be observed and measured. Optical coherence tomography is well suited

for studying the flow properties of microfibrillated cellulose even under conditions similar to industrial processing. According to Haavisto, the most important finding of the [doctoral thesis](#) was the link between the boundary layer behavior and the observed flow behavior.

"Flow phenomena important for processing occur in the immediate vicinity of the flow channel wall, i.e. in the boundary layer, which cannot be measured for microfibrillated cellulose with commonly used methods. The measurement methods traditionally used may even provide misleading information," Haavisto says.

The measurement methods developed in the doctoral thesis can also be utilized in developing the [material properties](#) of microfibrillated celluloses. It is noteworthy that the method is not limited to research of microcellulosic structures but is applicable to a wide variety of materials.

More information: Haavisto, Sanna. "Application of Doppler Optical Coherence Tomography in Velocity Profiling Rheometry of Complex Fluids," JYU dissertations. 2019. jyx.jyu.fi/handle/123456789/64974

Provided by University of Jyväskylä

Citation: Eye imaging technology provides opportunities in biotechnology (2019, August 5) retrieved 2 April 2024 from <https://phys.org/news/2019-08-eye-imaging-technology-opportunities-biotechnology.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.
