

Fundamental understanding of cell material interactions for nanocellulose hydrogels for tissue engineering

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We are now looking for a **Doctoral Researcher in the field of bioproduct technology**.

Do you want to decrease the dependence on animal models and develop plant-based hydrogels for tissue engineering? Are you curious about how interactions at interfaces affect cell growth and differentiation as well as materials properties?

We are now looking for a doctoral candidate to join the Bioproducts Chemistry group to use fundamental surface sensitive methods to study the interactions between living cells and biobased materials like nanocellulose to develop hydrogels for tissue engineering.

Scientific environment

The [Bioproducts Chemistry group](#) is dedicated to replacing fossil-oil based materials by renewable biomaterials from natural resources, such as forest biomass. We conduct interdisciplinary research on bio-based material science and surface chemistry of lignocellulosics. Efforts are laid on finding novel application possibilities for the main plant polymers; cellulose, lignin and hemicellulose. The approach to reach these goals is to focus on fundamental insight in surface chemistry of biomaterials, with a special focus on interaction forces. Our research areas are added value materials from biocolloids like hydrogels for tissue engineering, sustainable surface functionalization for example for textiles and barrier materials but also for better interactions with living cells and side stream valorization.

We have excellent facilities at Aalto University, School of Chemical Engineering (<http://www.bioeconomyinfra.fi>) and in Nanomicroscopy center (<http://nmc.aalto.fi/en/>). Relevant for this position is the Bio-AFM suitable for both imaging at nanoscale and measuring direct forces between living cells and other substrates in physiological conditions, the surface plasmon resonance (SPR) and quartz crystal microbalance (QCM-D) for in situ adsorption measurements.

Lecturer Juan-José Valle-Delgado will act as your instructor and Prof. Monika Österberg will supervise your work. The work will be done in close collaboration with Susanna Miettinen from Tampere University, Faculty of Medicine and Health Technology. Collaboration with relevant industry is also to be expected.

In the first weeks, you will be assigned your own onboarding buddy who will help you get started with your work and studies at Aalto.

Your role and goals

You will develop nanocellulose based hydrogels suitable for tissue engineering. You will become an expert on the surface sensitive techniques used in the group like atomic force microscopy (AFM), SPR and QCM-D. CIMANET organizes several networking events and joint courses that you are expected to participate in. In total 40 ECTS of theoretical studies are included. You will be expected to write scientific papers and present your work at international conferences.

Your experience and ambitions

- Experience of laboratory work and a keen interest to perform your own experiments and analyze your results.
- Excellent student track records
- General curiosity for science and interest to understand interfacial phenomena
- Patience and understanding of the cleanliness requirements for both cell work and surface science
- Experience with working with (mammalian) cells, cellulose, QCM-D, SPR or AFM are all considered assets but not requirements

You must have completed by 31 July 2024 or preferably earlier (to start employment on 1 August 2024) or by 31 December 2024 or preferably earlier (to start employment on 1 January 2025)

- a master's degree awarded by a university, or
- a study programme that in the awarding country gives eligibility for doctoral level studies

in chemical engineering, chemistry, or a closely related field. Preferably with a master in physical chemistry, bioproducts engineering or biomedical engineering. A good command of English is required, Finnish language is not.