

MWP – Young Researcher Abstract 2026

Project title: Itaconic Acid Functionalization of Pulp Fibers for Sustainable Materials	
Author: Jelka Feldhusen, Gunnar Westman	
Affiliation: Chalmers University of Technology	E-mail: jelka@chalmers.se
Abstract (approx. 200 words): My research focuses on utilizing itaconic acid, a biobased, non-toxic chemical expected to become a major future feedstock, for the functionalization of pulp-based materials. As is well established, novel materials are needed to replace or complement fossil-based systems as we transition toward a more sustainable society. With this, forest-based resources play an increasingly important role due to their inherent renewability. The first part of my PhD focused on the esterification of bleached kraft pulp using the anhydride of itaconic acid, developing a robust, scalable, and adaptable process for industrial applications, resulting in fibers with increased surface charge and wet-strength properties. Sheets produced from these fibers were further studied with simultaneous DMA/SWAXS measurements at the ForMAX beamline at MAXIV to investigate swelling and drying processes, crucial to understand for their use and application. Apart from exhibiting interesting properties on their own, the esterification further enables subsequent polymerization of itaconic acid onto the pre-esterified fiber surface, yielding a material suitable as a biobased superabsorbent for hygiene products, a complement to the current acrylic-based materials. The overall goal of my PhD is to develop simple and industry-relevant methods for creating new forest-based materials and expanding their applications in different fields.	
Key words: Cellulose modification, esterification, itaconic anhydride, materials characterization, DMA/SWAXS.	