

MWP – Young Researcher Abstract 2026

Project title: Cellulose nanofibril -based hydrogels for tissue engineering	
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Abstract (approx. 200 words): Cellulose nanofibril hydrogels (CNFs) are promising material for biomedical applications, as they are nontoxic, biocompatible, and partially biodegradable. However, breakthroughs for tissue engineering remain elusive. We argue this is due to insufficient and inconsistent characterization of CNFs, diminishing its adoption to wider use. In addition, CNFs lack transparency and proper degradation, complicating the visual quality control of cell culture along with cell recovery and quantitative biomarker analysis. As there is no universal tissue-matrix composition, variety of synthetically made extracellular matrix (ECM) mimicking scaffold materials have emerged without proper standardization. Thus, we wanted to characterize CNFs mechanical and rheological properties, and enzymatic degradability, to further prove that CNF can fit for variety of tissue model applications just by tuning the hydrogels fibril content, fibril surface chemistry and introducing ionic crosslinking. Lastly, as the predictive value of tissue models still comes with uncertainty due to poor standardization and validation, we focus not only on the mechanical and rheological profiling of CNFs but also on cell-material interactions. The key to mimic real tissues is in understanding how ECM cues mechanotransduction and thus affects tissue health. With this multidimensional characterization we can achieve standardized, validated and scalable CNF-based tissue models to demonstrate relevant biology.	
Key words: Cellulose nanofibril, hydrogel, extra cellular matrix, tissue engineering, tissue model, mechanical and rheological properties, biodegradation, cell-material interactions	