

MWP – Young Researcher Abstract 2025

Project title: Hardwood Delignification – Understanding chemistry and mass transport fundamentals	
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Abstract (approx. 200 words): For the necessary transition into a circular society, lignocellulosic resources are set to play a crucial role in replacing fossil-based materials, where kraft pulping is one of the key processes in the valorisation of such materials. However, faced with the challenge of achieving such a transition, increased resource efficiency and an expanded scope of products are necessary, which both require a well-developed understanding of the process. My research focuses on understanding the core chemical mechanisms of the main step in the kraft process, the delignification. Past research has mainly focused on the reactions of lignin, whereas mechanisms such as the solubility and transport of lignin out of pulp have only recently gained some interest. Through a combination of experimental work with a laboratory-scale flow-through reactor and computational modelling, we have gathered a body of results indicating that the kraft process cannot be described simply by reaction kinetics alone. Thus, the results challenge the conventional view of the kinetics of the kraft process, which may have implications for the development of future industry-scale pulping models. In addition, my work has been conducted on Nordic hardwoods, which yielded further insights into the delignification behaviours of industrially relevant, but academically understudied, wood species.	
Key words: Kraft delignification, Mass transfer, Kinetic model	