

MWP – Young Researcher Abstract 2023

Project title: The photochemistry of the future meets the forestry industry of the present	
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<p>Abstract (approx. 200 words):</p> <p>In ‘The photochemistry of the future’ Giacomo Ciamician stated that light-driven reactions would play a key role in the transition to a low-carbon economy. Milder reaction conditions, chemical selectivity and the use of sunlight are advantages in photochemical reactions. Therefore, we envision developing light-driven processes to convert biobased building blocks into renewable products. Lignin and terpenes are two biobased examples which can be sourced as byproducts from the forestry industry.</p> <p>We use light-driven and photocatalyst-free reactions to depolymerize lignin into smaller fragments, not requiring high-temperatures or metal catalysts. In addition, mono- and sesquiterpenes can be dimerized under sunlight using photosensitized reactions, and then hydrogenated to produce diesel and lubricant oil surrogates.</p> <p>In general, scalability is an issue in photochemical processes, especially when using sunlight. However, LED’s and the design of new photoreactors contribute to the commercialization of photochemical processes. The required understanding of the photophysics of lignin and how it varies in different reaction conditions is challenged by its complex and polymeric nature. Nevertheless, building blocks from lignin might be used in the synthesis of biobased materials such as bioplastics.</p> <p>Together, these strategies add value to streams from the forestry industry and contribute to a circular biobased economy.</p>	
<p>Key words: Photochemistry, lignin, terpenes, biobased, sustainability</p>	