

MWP – Young Researcher Abstract 2023

Project title: Lignin valorization: Paving the way to lignin-based materials through carboxymethylation	
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Abstract: The growing demand for sustainable polymeric materials has sparked intensive research endeavors to harness renewable resources like lignin. As an abundant source of natural phenolic structures, lignin exhibits exceptional potential as a macromolecule with remarkable thermal stability and rigidity. A comprehensive understanding of the structure-property relationships and degradability of lignin-based materials is vital to unleash their full potential and explore new applications. In line with sustainable practice and circularity, prioritizing degradability in material design is prominent. Herein, we propose a promising approach to address the degradability potential by integrating cleavable functionalities into lignin structure. Our preliminary investigations focus on elucidating the reactivity of phenolic and aliphatic hydroxyl groups. To this end, we employ technical Kraft lignin and cyclic extracted organosolv lignin to optimize the carboxymethylation reaction's conditions and selectivity. Rigorous characterization of the resulting lignin samples with techniques such as NMR, FTIR, and SEC, will unravel their chemical and physical properties. These invaluable insights will guide the design of innovative lignin-based thermoset systems. Moreover, this research aligns with the UN SDG 12 (responsible production and consumption) and 13 (climate action). By pushing the boundaries of sustainable material development, this work contributes to a more environmentally conscious future.	
Key words: Sustainability, renewable resources, lignin, carboxymethylation, degradable biomaterials	