

Catalyzing sustainability: heterogeneous catalysis as one of the main cornerstones

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Heterogeneous catalysis will play an important role in the transition to a circular economy based on the use of renewable resources and waste streams. In this talk, we will discuss the preparation of novel carbocatalyst-based systems. These catalytic systems have been implemented for various sustainable processes and will be presented in this talk. In the first part of the lecture, biorefinery processes based on the cellulosic fraction and lignin have been developed in my laboratory and will be discussed. In the second part, we will show the efficient use of metal-free acidic carbocatalyst containing dual functionalities, including high specific surface area, acid site density, and hydrogenation function, in plastic waste recycling. Additionally, we will present recent technologies in plastic waste recycling. Finally, we will discuss a basic carbocatalyst for the ring-opening polymerization of  $\epsilon$ -caprolactone to produce biodegradable polycaprolactone [1-3].

### References

- [1] F. Brandi, I. Khalil, M. Antonietti, M. Al-Naji, *ACS Sustainable Chem. Eng.* **9** 927 (2021)
- [2] F. Brandi, B. Panalone, M. Al-Naji, *RSC Sustainability* **1** 459 (2023)
- [3] M. Al-Naji, M. Antonietti, *ChemSusChem* **16** e202300740 (2023)

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## **BIO**

Dr. Majd Al-Naji obtained his Master's degree in Structural Chemistry and Spectroscopy from Universität Leipzig (2010–2013). Afterwards, he joined the group of Heterogeneous Catalysis in Leipzig under the guidance of Prof. Dr. Roger Gläser (2013–2017). Dr. Al-Naji will defend his habilitation thesis on July 2024 at the University of Leipzig. Dr. Al-Naji was a postdoctoral researcher at the Center for Sustainable Catalysis and Engineering at KU Leuven with Prof. Dr. Bert F. Sels (2017). He was the leader of the Biorefinery and Sustainable Chemistry group at the Max Planck Institute of Colloids and Interfaces (2018–2021). Currently, he is the leader of the Sustainable Value Chains group at BasCat – UniCat BASF JointLab at Technical University Berlin and habilitant at Universität Leipzig.