

Biorefinery: upgrading renewable feedstocks into unconventional building blocks

Dr. Davide ESPOSITO

Department of Colloid Chemistry, Max Planck Institute of Colloids and Interfaces,
14424 Potsdam, Germany
e-mail: davide.esposito@mpikg.mpg.de

Modern society is still heavily dependent on fossil resources for the generation of fuels, chemicals and pharmaceuticals. Unfortunately, the last decades have witnessed a constant depletion of traditional fossil feedstock. In addition, the global use of non-renewable resources has been responsible for a constant increase in environmental pollution. In this scenario, we are facing the challenge to provide solutions for a sustainable and environmentally friendly development. Recently, the scientific community has identified biomass and food waste as promising feedstocks for the generation of fuels and commodity chemicals. However, the generation of bio-based fine chemicals and building blocks from biomass using chemical strategies is still in its infancy, and its success will strongly depend on the development of efficient integrated conversion schemes. The main objective of a biorefinery is the development of successful strategies for the integrated conversion of biomass and waste into specialty chemicals, monomers and bio-active compounds.

In this talk, I will introduce both general aspects of biorefinery as well as selected examples from our work. In particular, the following topics will be discussed:

1. the development of solvo(hydro)thermal methods for biomass deconstruction, which enable the conversion of polysaccharides and lignin into an array of useful primary building blocks and platform chemicals;
2. the development of novel sustainable catalytic methods for the continuous flow upgrade and functionalization of primary biomass derived substrates;
3. the synthesis of value-added products on the basis of sustainable building blocks obtained through integrated biorefinery conversion schemes.

Selected references:

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