Enhanced Biomass Valorisation by Engineering of Polyoxometalate Catalysts (BioValCat)

J.-D. Krueger, M. J. Poller, J. Albert
Institute of Technical and Macromolecular Chemistry, University Hamburg, Hamburg, Germany

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Abstract

Producing fuels and chemicals from renewable raw materials, such as biomass, is needed to reduce our ecologic footprint and especially the CO_2 emissions. Therefore, the development of sustainable processes to produce e.g. platform chemicals based on biomass as renewable resource is currently one of the most important challenges of our society. One process for such valorization of biomass is the Erlanger OxFA process, where even complex biomass is selectively oxidized to formic acid and its derivatives, using a homogeneous polyoxometalate ($H_8PV_5Mo_7O_{40}$) catalyst and O_2 as an oxidant.[1,2] Although this process is already commercially applied by the OxFA GmbH since 2015, novel insights promised to drastically improve this technology further. A recent publication has shown that the formation of undesired CO_2 can be almost completely suppressed by the addition of methanol.[3] Mechanistic insights proved the catalyst-solvent interactions as main reason.[4] Interestingly, changing reaction parameters as type of gas, temperature and solvent systems can broaden the product scope,[5] e.g. formic acid can be converted to green H_2 or green CO (syngas equivalent) and lactic acid can be used to form polylactic acid (PLA) as biological degradable plastic. These aspects, which are the key of the BioValCat project, are summarized in Figure 1 and are under current focus of our research.

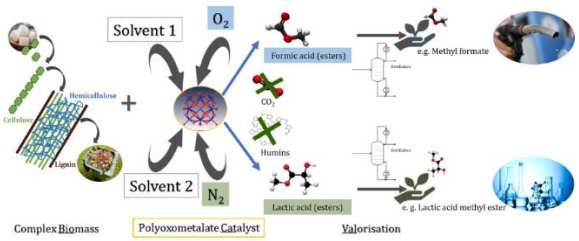

Figure 1: Summarised aspects of the BioValCat project (ERC Consolidator Grant No. 101086573)

References

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