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# Heat and Spin: Analyzing catalysts and depolymerization products using Thermoanalysis and Nuclear Magnetic Resonance

The production of high-quality chemicals based on the efficient use of sustainable resources has become an urgent global concern. In this context, the use of renewable starting materials such as different lignins as alternative to oil-based materials has been receiving increasing attention for years. Among these resources lignin is the second most abundant macromolecule on earth and technical lignins are potential sources for the production of important chemical building blocks. They can be successively depolymerized yielding valuable aromatic and aliphatic products, but this requires the production and use of stable and efficient catalytic systems and sustainable processes such as depolymerization by electrocatalytic methods. In order to further optimize catalyzed reactions, both the applied catalytic materials and the reaction products have to be thoroughly characterized by suitable methods.

Two of these methods are *Differential Scanning Calorimetry (DSC)* combined with *Thermogravimetry (TG)* and *Nuclear Magnetic Resonance (NMR)* spectroscopy. *DSC/TG* is a versatile method for investigating both the thermal stability of a novel catalyst and the stability of the obtained product. *NMR spectroscopy* is one of the most widely used routine analytical methods in research and development laboratories worldwide. With this method, the products obtained by electrochemical catalysis can be determined unambiguously and non-destructively. Furthermore, *solid-state NMR* offers a highly useful complement to the findings of electron microscopy and X-ray diffraction and absorption methods for the characterization of solid materials or nitrogen-containing catalyst systems. This talk will put a spot light on these analytical methods and their use within the endeavor of finding new and sustainable reactions and their required catalysts.

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