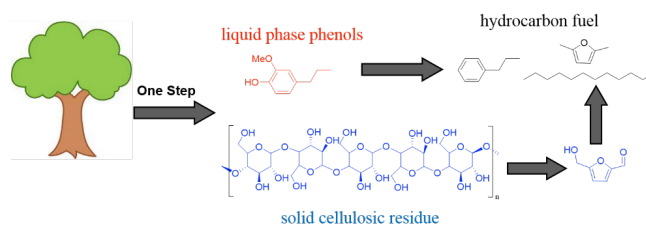


Special Seminar in Energy Research at the University of Pennsylvania

Sustainability through Catalysis: Making Biofuels and Chemicals from Biomass

Abstract

Transition metal catalysts have been an integral part of the success story of the petrochemical industry in the past century. Two grand challenges for this century are renewable energy and the utilization of green resources. Approximately 1.4 billion tons of lignocellulosic biomass is an annually renewable source of energy and feedstock in the U.S. alone. The major components of biomass are cellulose, hemicellulose/xylan, and lignin- all polymeric and contain high percentage of oxygen. Current biomass utilization processes do not make use of lignin beyond its heat value. We have developed selective catalysts that convert lignin in intact wood biomass directly into methoxyphenol chemicals, leaving behind the carbohydrates as a solid residue. The lignin-derived methoxyphenols can be deoxygenated further to hydrocarbon fuels. Furthermore, the carbohydrate solid residue can be hydrolyzed and converted to fuels and chemicals via simple cascade catalytic reactions. Based on these results, a synergistic biorefinery is proposed in which both the lignin and carbohydrate fractions are utilized to make fuels and chemicals.



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