Rational Pathway for Lignin-to-Fuel, Chemical, and Electrode Materials

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The effective utilization of lignin into liquid fuels, value-added chemicals, and high-performance electrode materials has received considerable attention because of possibility for designing economically-viable biorefineries. Howerver, the complex nature of lignin and change of its structure during delignification make it difficult to develop reasonable conversion methods. In this regard, this talk will be covered in three parts; first, liqnin liquefaction in sub- and supercritical fluids, which can result in the complete depolymerization of technical lignin into liquid fuel, will be discussed. Six types of lignin samples were produced from oakwood (OW, hardwood) and pinewood (PW, softwood) using three different delignification techniques (ethanolsolv, formasolv, and Klason) were tested. Second, selective production of linign-derived aromatic chemicals from native lignin in wood will be covered. The dissolution of lingin and selective b-O-4 bond breakage at relative low temperature can produce high-yield aromatic monomers. Lastly, the carbonization of technical lignin into hard carbon, which is a one of promising candidate as an anode in sodium ion batteries will be discussed.