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Fast pyrolysis of gamma-valerolactone lignin extracted from softwood

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Presently, fast pyrolysis process is extensively employed for lignin decomposition to provide renewable and value-added chemicals. However, liquid yield and liquid product distribution produced after the fast pyrolysis of lignin depend on structure and extraction method of lignin. In this work, the best condition for lignin isolation from softwood was investigated to generate the excellent liquid yield and selectivity. The gamma-valerolactone (GVL) mixed with water in the presence of diluted sulfuric acid was used as a green organic solvent for lignin extraction. The lignin content around 20%wt was isolated from softwood. The functional groups, decomposition and structure of the extracted lignin (GVL-lignin) were identified by Fourier-transform infrared spectroscopy (FT-IR), Thermogravimetric analysis (TGA) and Proton nuclear magnetic resonance spectroscopy (^{1}H NMR). The fast pyrolysis of GVL-lignin was performed in a microreactor directly connected to gas chromatography with a mass spectrometer (GC-MS) and also operated in a temperature range from 550°C to 850°C. We found that the pyrolysis temperature affects both liquid yield and liquid product distribution of GVL-lignin. The maximum liquid yield around 61% with less amount of gas and char yields was obtained at 750°C with a heating rate and a pyrolysis time of 20°C/ms and 20 s, respectively. Furthermore, the phenol products were found to be the largest fraction, followed by phenol alkoxy products.

Biography

Sureerat Jampa obtained BSc (Chemistry) with 1st class honors from Prince of Songkla University and MSc (Polymer Science) from the Petroleum and Petrochemical College, Chulalongkorn University. She is now a PhD student (Polymer Science) at the Petroleum and Petrochemical College, Chulalongkorn University. Her research focus involves mesoporous catalysts for CO-PROX and OSRM reactions, as well as fast pyrolysis of lignin.

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