

Potential of lignin residues from bioethanol processes for aromatic chemicals production

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(jimpark@postech.ac.kr*)

Lignin is the only natural resource of polyphenolic compounds coming from land biomass feedstocks. Cellulose and hemicellulose are significantly utilized as carbon sources for bioethanol fuel production; however, lignin, a non-fermentable matter to microorganisms, has been discharged from the bioethanol process and then combusted for low-quality heat energy production. In this study, residual lignin resources from corn stover and rice straw after acid-alkali pretreatments of the bioethanol process were chemically characterized and pyrolyzed to obtain bio-oils including phenolic compounds. Compared to a wood-based Kraft lignin, the residual lignin showed more reactivity and less thermal stability in pyrolysis reaction available to save energy inputs. Despite similar crop-based biomass, the corn stover- and rice straw lignin demonstrated slightly different pyrolytic pathways due to the inherent difference in polyphenolic building blocks. Consequently, pyrolysis of the corn stover lignin produced a relatively higher phenol content (10%) than those of the other lignin (< 6%). These crop-based lignin residues of the bioethanol process could be a sustainable source of aromatic compound production.