537e Hydrothermal Catalytic Conversion of Nutshells

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Agricultural by-products are a major source of biomass for biofuel conversion. Southeastern US produces great amount of nutshells from pecan, walnut, and peanut processing. In this study, we selected walnut shell as a representative agricultural by-product and applied a hydrothermal catalytic process to convert it into oxygenated organic compounds. KOH, Na2CO3, HCl and modified ZrO2 were used as catalysts in a batch reactor at various temperatures and pressures. Basic catalysts (KOH and Na2CO3) showed higher conversation rate of total carbon and more favorable to the generation of wide range of lower molecular weight organic compounds but lack of selectivity. HCl as catalyst promotes generation of levulimic acid whereas the modified ZrO2 selectively produces the furfurals. The results show that hydrothermal catalytic process is a promising approach to convert biomass and potentially able to generate important industrial chemicals by a selective catalytic reaction.