

Tailoring ZSM-5 Zeolites for the Fast Pyrolysis of Biomass to Aromatic Hydrocarbons - DTU Orbit (09/11/2017)

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The production of aromatic hydrocarbons from cellulose by zeolite-catalyzed fast pyrolysis involves a complex reaction network sensitive to the zeolite structure, crystallinity, elemental composition, porosity, and acidity. The interplay of these parameters under the reaction conditions represents a major roadblock that has hampered significant improvement in catalyst design for over a decade. Here, we studied commercial and laboratory-synthesized ZSM-5 zeolites and combined data from 10 complementary characterization techniques in an attempt to identify parameters common to high-performance catalysts. Crystallinity and framework aluminum site accessibility were found to be critical to achieve high aromatic yields. These findings enabled us to synthesize a ZSM-5 catalyst with enhanced activity, which offers the highest aromatic hydrocarbon yield reported to date.

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