Conversion of glucose to 5-hydroxymethylfurfural over the dual-function zeolite acid catalyst

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5-Hydroxymethylfurfural (5-HMF) is an excellent chemical platform molecule used for the generation of liquid fuel and fine chemicals. It can be synthesized by two-step series reactions using glucose as a starting material: i) isomerization of glucose to fructose over the Lewis acid site, and ii) dehydration of fructose to 5-HMF over the Brønsted acid site. In this study, we newly synthesized the dual-function core-shell zeolite acid catalyst through the steam-assisted crystallization method. Core and shell were composed of Sn- and H-zeolites corresponding to Lewis and Brønsted acid sites, respectively. Intensive studies using (S)TEM-EDS/elemental mapping, pyridine-IR, ^{29}Si MAS NMR, and ^{119}Sn MAS NMR clarified the physicochemical properties of the core and shell acid sites. From the overall results, we demonstrated that this dual function acid catalyst exhibited the higher 5-HMF yield when compared to the performances of individual H- and Sn-zeolites.