Effects of acidic sites and cokes on the seed-modified ferrierite zeolite to DME carbonylation activity

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Dimethyl ether (DME) can be synthesized by CO hydrogenation and the DME can be further converted to methyl acetate (MA), which is important intermediate material to produce ethanol, acetic acid or various valuable products. Thus, the conversion of DME to MA over zeolite catalyst by a gas-phase DME carbonylation is highly important for carbon recycling. During the DME carbonylation reaction, Brønsted acid sites of zeolite play an important role, however, the zeolite can be easily deactivated by coke depositions. The quantification of acid site density and amount of coke deposited on the zeolite surfaces are essential to design the stable zeolites. In the present research, a seed-derived ferrierites (FERs) was synthesized with various weight percentages of commercial FER seed and they were applied to the DME carbonylation. The activities of the FERs were correlated by the amounts of acid sites and cokes, which were quantified by various characterization tools.
Keywords: Ferrierite (FER); dimethyl ether (DME) carbonylation; methyl acetate (MA); coke deposition; deactivation; Seed-modified FER