

Dehydrogenation of ethane and subsequent CO<sub>2</sub> activation on iron impregnated ordered mesoporous TiO<sub>2</sub> for chemical looping application

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Chemical looping process using redox catalysts has been interested to selectively produce C<sub>2</sub>H<sub>4</sub> by dehydration of C<sub>2</sub>H<sub>6</sub> and greenhouse gas of CO<sub>2</sub> activation to CO. The reduction reaction on the iron-loaded mesoporous TiO<sub>2</sub> with 5 to 20 wt%Fe using C<sub>2</sub>H<sub>6</sub> selectively produced C<sub>2</sub>H<sub>4</sub>, and the catalyst also subsequently activated CO<sub>2</sub> to CO by oxidation reaction. The catalyst was prepared by impregnation method of iron precursor on the mesoporous TiO<sub>2</sub>. A maximum 88% selectivity of C<sub>2</sub>H<sub>4</sub> with 15% conversion of C<sub>2</sub>H<sub>6</sub> was obtained on 15wt%Fe/TiO<sub>2</sub> at 600 oC, and CO<sub>2</sub> conversion of 7.9% was separately obtained on the same catalyst at 700 oC through facile redox reactions of active metals. The structural properties of Fe/TiO<sub>2</sub> were characterized by N<sub>2</sub> sorption, X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS) and so on.