Oxidative dehydrogenation of ethane and CO2 activation by cyclic redox reactions for chemical looping applications

배종욱†, 정민혜
성균관대학교
(finejw@skku.edu†)

Oxidative dehydrogenation of ethane and a CO2 activation to CO by a chemical looping process (CL-ODH) are attractive to simultaneously produce olefins as well as CO feedstock. Many transition mixed metal oxides were investigated for the cyclic redox reactions, which were designed to convert ethane into ethylene by reduction step and subsequent CO2 activation to CO by oxidation step through a reduction-oxidation reaction on the transition metal oxides. A prototype Fe/TiO2 with 5wt%Fe exhibited a higher ethane conversion of 9.7% and ethylene selectivity of 91% by showing a volcano-plot in terms of Fe contents in the range of 5 - 20wt%Fe. In addition, Ce-incorporated FeTiOx with 5wt%Fe showed a superior ethane conversion by CL-ODH reaction. The redox properties of the mixed metal oxides were closely related with catalytic performances such as number of oxygen vacant sites and adsorption natures of reactants on the reducible mixed metal oxides.