

Steam CO₂ Reforming of Methane over Ni functionalized mesoporous silica

양은혁^{1,2}, 김나영², 임성수², 문동주^{2,*}

¹UST; ²KIST

(djmoon@kist.re.kr*)

Steam CO₂ reforming of methane (SCR) is a promising way to produce synthesis gas which can be a feedstock for GTL-FPSO process. Mesoporous silica has high surface area and narrow pore size distribution. Therefore, mesoporous silica was used as catalytic support. In a typical procedure, thiol group functionalized and non-functionalized mesoporous silica was prepared by hydrothermal treatment and active metal is impregnated on it. Prepared catalysts were characterized by various techniques such as N₂ physisorption, CO chemisorption, TPR, XRD, SEM, TEM-EDS and TG analysis. Commercial simulation package was used to estimate optimum experimental conditions for SCR of methane. The simulation results were compared with the experimental results under the tested conditions.

It was found that Ni was well dispersed on functionalized silica because of interaction between thiol groups and Ni²⁺ ions. And it showed higher catalytic performance and less sintering of active metal in the SCR of CH₄ at the reaction conditions of 850°C, 21 bar and molar ratio of CH₄:CO₂:H₂O = 1 : 0.7 : 1.55.