

Selection of kinetics model of $\text{Fe}_2\text{O}_3/\text{CeO}_2$ and $\text{Fe}_2\text{O}_3/\text{CeO}_2\text{ZrO}_2$ on reduction reactions for three reactor chemical looping system

김재호, 이윤제, 강경수, 배기광, 김창희, 조원철, 정성욱,
박주식*
한국에너지기술연구원
(cspark@kier.re.kr*)

Three reactor chemical looping (TRCL) system is one of the promising technologies for pure hydrogen production without emission of carbon dioxide from methane. The objective of this study was to obtain the kinetics model of reduction reactions taking place in the TRCL system using oxygen carriers as like $\text{Fe}_2\text{O}_3/\text{CeO}_2$ and $\text{Fe}_2\text{O}_3/\text{CeO}_2\text{ZrO}_2$. The experiment tests are carried out in a thermogravimetric analysis (TGA), using methane as a reducing gas. The selection of kinetics models is preformed via a selecting method of kinetics models presented by Hancock and Sharp. The values of activation energy are determined from the selected kinetics models, which are compared with the value of activation energy of $\text{Fe}_2\text{O}_3/\text{ZrO}_2$. Morphological properties and structures of the oxygen carriers are observed by SEM and XRD.