

Investigation of CaO–CaCO₃ Thermochemical Energy Storage System Applying Novel Calcium Chloride-based Additives for Concentrated Solar Power

최다솔, 박영준[†]
광주과학기술원
(young@gist.ac.kr[†])

Concentrated solar power (CSP) is one of the renewable energy systems, which is expected to provide dispatchable energy supply for 24 hours, due to its large-scale heat energy storage system. To achieve dispatchability, thermochemical energy storage (TCES) system based on the reversible carbonation–calcination reaction of CaO–CaCO₃ has been investigated. However, continuous reduction of reversibility limits the overall energy storage and discharge performances. In this study, calcium chloride-based additives were impregnated into CaO–CaCO₃ systems, to enhance the carbonation reactivity as a solution for the reduction of reversibility. Primarily, the effects of calcium chloride additives were observed, then the fundamentals of effects were investigated by providing various Ca-based composites. As a result, new integrated Ca-based composites were suggested as solar absorbing and storage materials, which achieved high energy storage density and durability by enhanced reaction performance. Material analyses were mainly based on TG–DSC for reaction observation, and supported by various characterization techniques such as BET, in-situ XRD, SEM, etc.