A Fundamental Understanding of Carbon Dioxide Capture by Magnesium Oxide-Based Sorbents at High Temperature

서정길†
명지대학교
(jgseo@mju.ac.kr†)

We successfully carried out the direct observation of the triple-phase capture process involved in the sorption of gaseous CO2 over molten EM-promoted solid MgO via in situ TEM and detected the changes happening within the system as a whole in real time. We also conducted studies on the interface between EM over solid MgO and MgCO3 formed during sorption, which further clarifies the interaction between MgO and EM. Secondly, we report the feasibility of using commercially available hydrotalcites as stabilizing additives for NaNO3-promoted MgO sorbents. We demonstrate how the simple addition of stabilizers such as hydrotalcites which interact with MgO and NaNO3 can alter and improve the MgCO3 formation on molten nitrate-promoted sorbents, resulting to improved stability and increased cumulative CO2 capture capacity. Lastly, we report simple methodology to identify the Mg ion inversion in the MgO-Al2O3 by solid state NMR, and verify the correlation with CO2 capture capacity of MgO-rich MgO@MgO-Al2O3 spinel structures.