Synthesis and characterization of TiO_2 stabilized MgO based sorbents for CO_2 capture

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Mesoporous MgO-TiO_2 sorbents with different amount of magnesium and titanium were synthesized via cooperative self-assembly of the metal precursor and the soft template P123 triblock copolymer in ethanolic solution under acidic conditions. It was observed that, the phase was transformed in the order, $MgTiO_3$ (0.5-2.0) < MgO-$MgTi_2O_4$ (3.0-4.0) <MgO-Mg_2TiO_4 (>5.0) and the CO_2 adsorption increased in the order $MgTiO_3$ (0.5-2.0) <MgO-Mg_2TiO_4 (5.0) <MgO-Mg_2TiO_4 (4.0)< $MgTi_2O_4$ (3.0). For CO_2 capture application, formation of MgO-$MgTi_2O_4$ is beneficial analogous to $MgAl_2O_4$ spinal phase. In the process of CO_2 adsorption, high surface are (111.4m2/g), pore volume (0.45cm3/g) as well as appropriate basic sites of Mg-O-Ti makes it a plausible candidate for CO_2 adsorption. The results suggest that, the developed sorbent has good thermal stability, and recyclability. This work was supported by the National Research Foundation of Korea (NRF) funded by the Ministry of Education (Grant number: NRF-2013R1A1A2060638).