Hydrotalcites: High Pressure and High Temperature CO$_2$ Adsorption

Authors: Mert Atilhan, Aysha Al-Mohannadi, Enas Azhar, Layal BaniNaser, Ashar Diab, Ferdi Karadas
Institution: Qatar University, Doha, Qatar
E mail: mert.atilhan@qu.edu.qa

The use of promising solid-state adsorbents is an emerging field in carbon dioxide capture and storage (CCS) owing to their promising sorption capacity and facile regeneration behaviour. Hydrotalcites, a class of layered double hydroxides (LDHs), are specifically suitable for high capacity CO$_2$ sorption studies at high temperatures since they have a robust structure and their structures could easily be modified. Herein this work, derivatives of layered double hydroxides were prepared by substituting the Al ion systematically with Ga, Ce, Y, and La in specific percentages followed by characterization with powder X-Ray Diffraction (XRD), Infrared (IR) spectroscopy, and the TGA analysis. The samples were then tested for their CO$_2$ sorption behaviour by using two different apparatus, first at high temperatures (~300°C) using the Rubttherm Thermal Analysis Sorption Device and through magnetic suspension sorption device at pressures up to 200 bars. Presented data is a part of a student project at Qatar University, Chemical Engineering Department.