

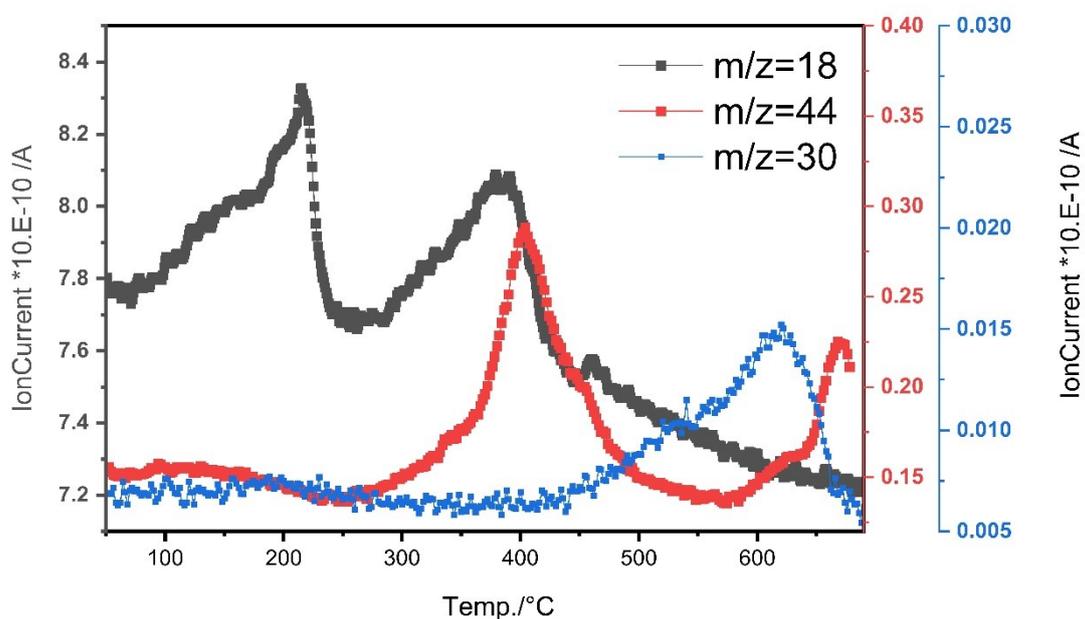
Temperature controlled reversible hydration/dehydration reactions in layered double hydroxides for thermochemical energy storage

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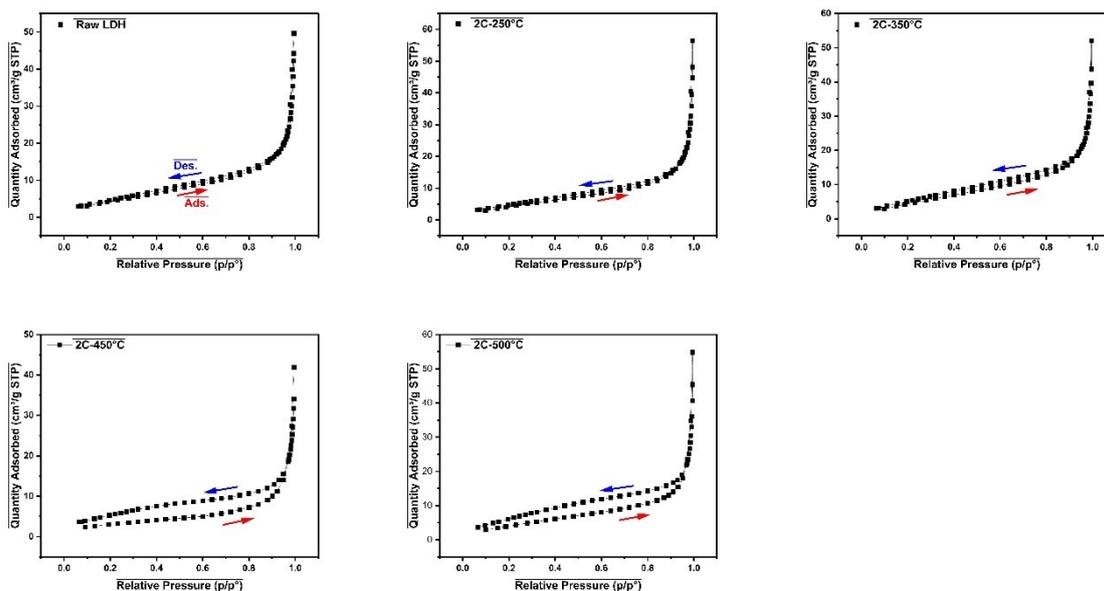
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Supporting Information



S1: Mass spectroscopy of the released compounds during TGA measurements

Figure S1 shows the evolution of gas release during heating, with two prominent signals at $m/z = 18$ observed between 50°C and 200°C , confirming that the initial mass loss is due to the release of adsorbed and interlayer water. A second mass loss, occurring around 400°C , is accompanied by additional peaks in the mass spectrometry data, indicating the simultaneous release of hydroxyl groups and CO_2 in varying amounts. Notably, CO_2 evolution begins only after the water release peaks, reaching a maximum around 350°C , suggesting sequential decomposition steps. The presence of carbonates is likely due to contamination during sample handling or synthesis. In addition, a distinct peak at 400°C is attributed to the release of nitrate species.



S2: N₂ adsorption/ desorption of Mg/Al LDH before and after cycling at different temperatures

Figure S2 displays the N₂ adsorption–desorption isotherms for both the raw and cycled Mg/Al-LDH samples, tested at various temperatures over two cycles. The isotherms exhibit a clear Type IV profile with an H3-type hysteresis loop, which, according to IUPAC classification, is indicative of a mesoporous structure typically associated with slit-like pores formed by aggregates of plate-like particles. For the raw MgAl-LDH, the surface area was estimated at 20.40 m²/g, and the average pore diameter was approximately 15.04 nm.