Architecture of Silica-Intercalated Hydrotalcites with Porous Structure

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Hydrotalcites are formally derived from layered double hydroxides (LDHs), general formula $[M^{2+}_{1-x}M^{3+}_{x}(OH)_2](A^{n-})_{x/x}\bullet mH_2O$, consisting of positively charged brucite, $Mg(OH)_2$, and the charge compensating interlayer exchangeable anions. The anion exchangeable LDHs with positively charged lamellar and exchangeable hydrate gallery have attracted much attention as a starting material of pillared layered solid to mimic zeolite-type structure possessing larger and more modifiable pores and active sites.

Under mild temperature, Si-intercalated hydrotalcites, SiO_2/LDH=(0.1-1), were prepared successfully as mesopore framework pahse at 0.4-0.8 °PXRD pattern and about 450 $m^2\bullet g^{-1}$ and 0.35 $cm^3\bullet g^{-1}$ at BET surface area and pore volume. The intercalation of silicate anions in hydrotalcite exhibited more thermal stability to 550°C than the lamellar structure being maintained up to 400°C. These suggest the formation of new pore framework by a strong interaction of silicate anions into the LDH inner-surface with the interlayer carbonate or hydroxyl groups.