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Facile preparation methods of hydrotalcite layered materials and their structural characterization by combined techniques

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Abstract

Hydrotalcites are layered double hydroxides (LDHs) of the anionic clay family. They can be obtained by synthesis, with high purity and controlled stoichiometry but with much larger preparation efforts and costs with respect to natural ores. Their properties can be tailored by changing the metals of the layer, or by inserting proper inorganic or organic anions. The reason of the few industrial applications of LDHs might be the difficulty of scaling up their synthesis and anion exchange methods, requiring often cumbersome procedures for filtering, recovery and purification of the final products. Recently, huge efforts were made to obtain facile and easily scalable preparation methods, especially favoured by the almost complete elimination of solvents and water-based procedures. The structures of the nanocomposites were studied by several techniques, from electron microscopy and diffraction to X-ray powder diffraction (the unique structural techniques able to face the low crystallinity of these materials) coupled with others, to obtain an exhaustive view of LDHs structure and reactivity. These advancements and the perspectives of larger LDHs industrial applications are described.

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