ELECTROSYNTHESIS OF HYDROTALCYTE-TYPE ANIONIC CLAYS AS PRECURSORS OF STRUCTURED CATALYSTS

A. Vaccari
Dipartimento di Chimica Industriale "Toso Montanari", ALMA MATER STUDIORUM
Università di Bologna, Viale del Risorgimento 4, 40136 BOLOGNA
angelo.vaccari@unibo.it

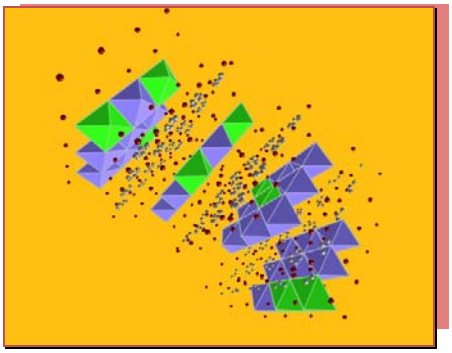

Figure 1. Schematic picture of a hydrotalcite-type anionic clay

Synthetic hydrotalcite-type (HT) anionic clays (also called layered double hydroxydes, LDHs), with general formula $[M^{2+}_{1-x}M^{3+}_{x}(OH)_2]^{x+}\ [A^{n-}]_{x/n} * mH_2O$ (Fig. 1), have many and interesting applications, as such or after thermal decomposition, due to their specific properties [1,2]. Furthermore, they are relatively easy and cheap to prepare on both laboratory and industrial scale and different preparation methods (co-precipitation, precipitation at increasing pH, urea method, sol-gel, etc.) have been reported. Thus it is not surprising the growing interest towards HT compounds in the last twenty years, such as evidenced by the increasing number of papers and patents reported in the literature. More recently, the electro-base generation method [3] of HT phases has been employed to prepare sensors or biosensors [4-7]; furthermore, electrosynthesized HT phases have been used as precursors of catalysts for the H_2 production [8-11], although noticeable differences exist between the HT film features required for sensor and catalytic applications. The electrochemical route represents a promising alternative to the washcoating or other techniques [12-14] for coating metallic supports, taking advantage of the electrical conductivity of the materials. Catalysts coated on three-dimensional metallic supports (honeycombs, foams, felts or fibers) are gaining increasing interest, since the resulting structured catalysts show very useful properties (high geometric area and mechanical resistance, large void fraction and minimized pressure drop) [15-17] with, furthermore, the enhancement of the heat transfer in the system. In this talk the role of main electrochemical parameters as well as the composition of HT precursors will be reviewed with the aim to evidence the possibility to optimize both the properties of the coating and catalytic performances. The phases present at each step have been deeply characterized and the activity obtained compared with that of conventional catalysts.

References

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