FACILE SYNTHESIS AND CHARACTERISATION OF FLUORESCING HYDROTALCITES

Dietmann, K. M.[1], **Rives, V.**

GIR-QUESCAT, Dpto. Química Inorgánica, Universidad de Salamanca, Salamanca, 37008,
[1]kdietmann@usal.es

Here we present a fluorescing Mg,Al-Layered Double Hydroxide (LDH) with the hydrotalcite structure which was synthesised via co-precipitation from the corresponding metal nitrate solutions at alkaline pH-value under nitrogen atmosphere (Feitknecht & Gerber, 1942). Samples were aged at 25 °C under constant agitation from 30 min to 24h and with constant bubbling of nitrogen. All synthesised samples were characterised regarding their phase composition, using powder X-Ray diffraction (PXRD), their chemical composition, using Infrared spectroscopy, and particle properties, e.g., specific surface area and particle size distribution. Additionally, thermal analyses coupled with mass spectrometry were carried out to comprehend alterations in samples mass and amount of heat absorbed/evolved over temperature and to detect the gases released during the thermal decomposition of the samples. Ultraviolet–visible spectroscopy was used to compare the excitation energy of the unintercalated fluorescein sodium salt with that of the fluorescing LDH.

PXRD results and infrared spectra confirmed the oriented intercalation of the dianionic form of fluorescein in the interlayer of the Mg,Al-LDH. Results of comparative thermal measurements and UV-vis spectroscopy of the unintercalated fluorescein sodium salt and the fluorescing-LDHs were consistent with those of other dyes, namely, methyl red (Tian et al., 2007) or perylenediimide dye (Chakraborty et al., 2010). Upon intercalation into the LDH the thermostability as well as the photostability of the fluorescent dye were enhanced. The particle size of the fluorescing-LDH could be easily tuned by varying the experimental synthesis conditions and aging time. The easiness and economic synthesis route plus the tuneable particle size anticipate a wide range of applications.

This study is part of a project that has received funding from the European Union´s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 675219.

REFERENCES

Chakraborty, C.; Dana, K.; Malik, S. 2010. Intercalation of Perylenediimide Dye into LDH Clays: Enhancement of Photostability. Journal of Physical Chemistry C, 115, 1996–2004.

Feitknecht, W., Gerber, M. 1942. Zur Kenntnis der Doppelhydroxyde und basischen Doppelsalze III. Über Magnesium-Aluminiumdoppelhydroxyd. Helvetica Chimica Acta, 25, 131-137.

Tian, Y., Wang, G., Li, F., Evans, D. 2007. Synthesis and Thermooptical Stability of o-Methyl Red-Intercalated Ni-Fe Layered Double Hydroxide Material. Materials Letters, 61, 1662-1666.