

Nanocomposites and nanomaterials

Organo/LDH nanocomposites as sorbents of cationic dye from aqueous solutions

G.M. Starukh, O.P. Rozovyk

*Chuiko Institute of Surface Chemistry, National Academy of Sciences of Ukraine,
17 General Naumov Str., Kyiv 03680, Ukraine*

E-mail: starukh_galina@ukr.net

Adsorption technique is effective and practical in the treatment of wastewaters containing dyes owing to its high efficiency, simplicity and the availability of many adsorbents. Layered double hydroxides (LDH) having a positively charged layered brucite related structure are suitable for sorption of anionic species, but are not applicable for positively charged ones. The intercalation of surfactant into LDH interlayer would permit the sorption of many types of organic molecules including cationic species. In our work, we prepared dodecylsulfate (DDS)-intercalated LDH that show a significant improvement of sorption ability concerning basic dye Methylene blue (MB).

Zn-Al LDH with different ratio Zn:Al have been synthesized by coprecipitation method. Surfactant intercalated LDH were obtained by the calcinations–rehydration of Zn–Al LDH precursors. The obtained nanocomposites were characterized by the means of the X-ray diffractions, Fourier infrared, thermal analysis, and morphology analysis (surface characteristics analysis and scanning electron micrographs).

The increasing of adsorption capacity of Zn–Al LDH was reached by its modification by sodium dodecylsulfate (Fig.1).

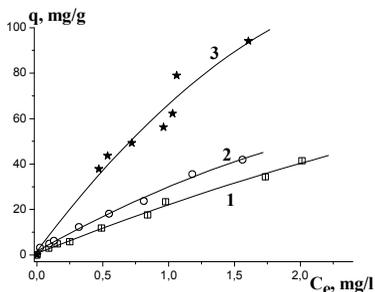


Fig. 1 Adsorption isotherms for MB onto Zn–Al LDH, Zn–Al oxides, Zn–Al-DDS LDH (Zn:Al = 1:4).

We consider that MB sorption process is the cooperation both of the adsorption on hydroxide surface through forming hydrogen bonding and incorporation of MB molecules into LDH interlayer due to electrostatic interaction with DDS^- anions.