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Zinc oxide nanospheres obtained from luminescent layered double hydroxides (LDH) nanotubes

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Research on rare earth-based materials presents significant potential to overcome some of the problems encountered when attempting to apply materials with optical properties, especially in the development of alternative energy sources. The proposals for research on luminescent materials constitute an important and current part of the field of new material science (preparation, characterization, and application of light-emitting materials). Layered double hydroxides (LDHs) are a class of anion-exchange materials with a general chemical formula of $[M^{II}_{1-x}M^{III}_{x}(OH)_2]^{x+}[A^{n-}_{x/n}]^{x-}\cdot yH_2O$ (M: metal, A: anion). The two-dimensional arrangement of the LDH structure results in a very important type of lamellar inorganic matrix considering specially its chemical composition versatility. In this way, not only the cations present in the layered structure can be partially substituted by rare earth elements, but also sensitizing molecules can be accommodated between its layers through ion exchange with the intercalated anions. Thermal treatment of LDHs nanotubes can generates metal oxides nanospheres from its metallic layers (Figure 1). Here we present a new strategy for the formation of nanospheres upon thermal treatment of ZnAlEu LDH nanotubes. The choice of the rare earth elements is associated with the desired features of the material: for example, the Eu^{3+} presents intrinsic luminescent properties which can be used as a spectroscopic probe to study its chemical environment in the material used as a matrix.

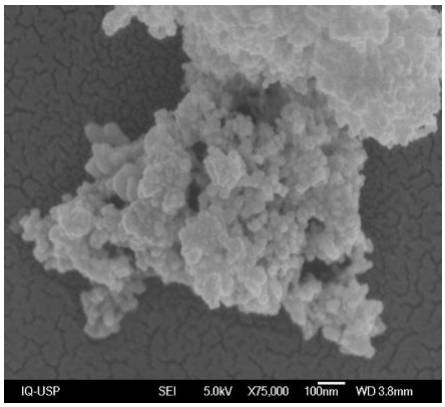

Figure 1. Scanning electron microscopy of the ZnO nanospheres.

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