Zn_2Al-LDH doped with Ce^{3+} ions for potential sunscreens

Gustavo P. Saito[1*], Marian R. Davolos[1], Marco A. Cebim[1], João H. S. Romero[1]

[1]*UNESP- Instituto de Química- Dep.Química Geral e Inorgânica – LML – Laboratório de Materiais Luminescentes – Rua Francisco Degni n° 55, Bairro Quitandinha, CEP14800-900, Araraquara-SP, Brazil*

*e-mail: gustavopsaito@gmail.com

The study of the new UV filters is very important because these materials are responsible for skin protection from excessive exposure to UV radiation. Thus, the goal of this work is development of potential UV filters by doping Zn_2Al layered double hydroxides (LDH) with Ce^{3+} ions. The lamellar compounds were prepared by coprecipitation method in pH constant. A Zn^{2+}, Al^{3+} (molar ratio equal 2) and Ce^{3+} (0.1%, 0.5%, 1%, 5% e 10 % in mol) mixed solution was slowly added to 150 mL of deionized water under N_2 atmosphere with vigorous stirring. The pH of the resulting solution was sustained at 8.5 with NaOH solution until the end of the precipitation. The suspension was stirred vigorously and the obtained solid was separated by centrifugation, washed and dried under reduced pressure in the presence of silica. The samples were characterized by X-ray diffraction, vibrational infrared spectroscopy, Raman spectroscopy, UV-VIS diffuse reflectance spectroscopy and color index. The presence of the reflections characteristics of the hydrotalcite compounds in the XRD patterns indicates the formation of ordered lamellar materials with higher purity phase. Besides, doped materials show enlargement of these reflections when compared to the LDH matrix. This fact indicates the insertion of the Ce^{3+} ions into lamellae and/or adsorption in the LDH. In the vibrational spectra observed typical bands of LDH refers to the stretching of the O-H bonds and of the Zn-O and Al-O bonds. Moreover, the doped samples spectra show a band around 375 cm^{-1} attributed to the stretching of the Ce-O bonds indicating interactions between Ce^{3+} ions and LDH. The UV-VIS diffuse reflectance spectra present bathochromic shift of the absorption edge according to the dopant amount increasing and these samples show higher absorption of the UV radiation.The color diagram shows white and/or yellow color of samples allowing their application in sunscreens without compromise of the aesthetics. The materials obtained have singular optical properties which can lead to improved sunscreens.

References:

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