



CYCLE DE CONFÉRENCES DE CHIMIE

*Avec le concours de : Manufacture Française des Pneumatiques MICHELIN
Ecole Nationale Supérieure de Chimie de Clermont-Ferrand
Institut de Chimie de Clermont-Ferrand (ICCF UMR 6296)
U.F.R.S.T. / Master de Chimie / Département de Chimie*

Jeudi 18 Octobre 2012 à 16h (Hors cycle)

Amphi de Chimie Paul REMI - (Site des Cézeaux)

Pr. Gilles VILLEMURE

Department of Chemistry, University of New Brunswick (Canada)

Investigation of Electrochemical and Electrochromic Properties of Nickel-Aluminum LDH Films.

An overview of our recent work on the thin films of Ni-Al-LDHs will be presented. The first part will details the effect of electroactive ions on the electrochromic response of the LDH films. The addition of electroactive cations, such $[\text{Co}(\text{bpy})_3]^{2+}$ or anions such as $[\text{Fe}(\text{CN})_6]^{4-}$ was found to greatly improved the reversibility of the colour changes observed upon oxidation-reduction of Ni-Al LDH films. This is attributed to an efficient electron transfer between the ions in solution and nickel sites in the LDH layers. In presence of a mixture of $[\text{Co}(\text{bpy})_3]^{2+}$ and $[\text{Ru}(\text{bpy})_3]^{2+}$ large reversible optical density changes (ΔOD) of 0.41 between the bleached and colour states were obtained. These colour changes could be sustained over multiple oxidation-reduction cycles. The non-electroactive counter ions present in the LDH interlayer spaces also affect the electrochemical response of LDH films.

In the second part, a comparison of the behaviour of Ni-Al-Cl, Ni-Al- CO_3 and Ni-Al- BO_3 LDHs will be presented. It was found that nickel in films of Ni-Al-Cl LDHs was easier to oxidize than nickel in films of Ni-Al- CO_3 LDHs. This is potentially important in connection with the use of nickel LDHs as alternative cathode materials for high performance rechargeable batteries. Preliminary work on controlling of the 3D structure of LDH films also will be presented. The preparation of Ni-Al-LDH films having inverse opal structures, 3D LDH networks surrounding hollow interconnected spheres will be described.