Ni^{3+} CONTAINING NiO_X THIN FILMS FOR ENHANCED DURABILITY IN ELECTROCHROMIC DEVICES

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Nickel oxide thin films are known as optical active counter electrode in electrochromic devices, ECDs. ECDs are able to modify their optical properties under an applied voltage. For instance, they are well suitable for energy saving when used as smart windows in buildings [1]. The optical switch of nickel oxide from a transparent to a brownish state on oxidation can be advantageously complementary to the blue coloration of cathodic tungsten oxide active electrode, leading to color neutrality devices. In this study, in order to ensure high electrochromic performances of NiO-based films in non aqueous electrolytes, starting by a cation insertion, we prepare films containing unnegligible amount of Ni^{3+}. In a first route, this was achieved by lithium doping using the Pulsed Laser Deposition technique [1]. In a second route, Ni^{3+} containing NiO_x thin films were prepared by new peroxo soft chemistry route from nickel acetate precursor and hydrogen peroxide [2]. Herein, the high electrochromic performances of the films will be reported in lithium-conducting electrolyte. Finally, the electrochromic behavior of full devices using lithium conducting ionic liquid-based membrane as electrolyte will be discussed.

[1] Claes Göran Granqvist, Nat. Materials 5, 89-90 (2006).

[2] Daehoon Park, et al. Electrochimica Acta (Submitted)

[3] Franc Svegl et al. Solar Energy Materials and Solar Cells (Submitted)