

## Electrochromic Properties of Sol-gel NiO Films Doped with Ti

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Electrochromic films of NiO &  $Ni_xTi_{1-x}O_{(2-x)}$  (with Ti concentrations 5, 10, 15, 20, 25 & 30%) have been prepared by the sol-gel route using dip coating technique onto fluorine-doped tin oxide-coated glass substrates (FTO/glass). Ethanolic sols from nickel acetate tetrahydrate ( $Ni(CH_3COO)_2 \cdot 4H_2O$ ) and titanium isopropoxide precursors were used in the preparations. The nano-sized films were sintered in air between 250 and 300°C. Characteristics of different films were studied in a comparative manner. Photoluminescence spectra, electrochromic behavior, cyclic voltammetry, XRD, thickness and SEM have been investigated.

Typically, as the  $TiO_2$  content was increased, film characteristics were enhanced. Mechanisms of coloration and morphology transformation of the layer during cycling in 0.05 M KOH electrolyte were discussed in terms of an activation and degradation period. Calculation of cathodic charge ( $Q_c$ ), anodic charge ( $Q_a$ ), Optical density & Coloration efficiency were made. Our results indicate that electrochromic and other characteristics of the NiO can be enhanced by addition of  $TiO_2$  at certain concentrations.