

Electrochromic Nickel Oxide films made by reactive r.f sputtering from different target

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Nickel oxide (NiO_x) films were deposited by reactive radio frequency sputtering from Nickel and Nickel oxide target, maintaining the r.f. power and varying the oxygen flow in the gas mixture of Ar and O_2 , from 5% up to 30%. The Ni/O ratio was determined by Rutherford Backscattering Spectroscopy (RBS); the microstructure was investigated by X-ray diffraction. The deposition rate resulted to be strongly dependent on the type of the utilized target. The electrochromic behaviour in aqueous alkaline electrolyte (0.1N KOH solution) was investigated by electrochemical ciclization. Samples made by NiO target have the lowest N/O ratio (0.5), the highest value of intercalated charge (about 8 mC/cm^2) but the smallest reversible changes in optical absorption in the wavelength range 330-1200 nm. Among the same samples the highest value of the intercalated charge was found for those deposited at low oxygen flow.

Samples deposited by Nickel target don't exhibit large variations in the value of the exchanged charge, the measured Ni/O ratio indicates a stoichiometry closer to NiO. The commutation response time is estimated by measurement under the application of a square waveform potential.

A comparison is made with electrochromic ability of Ni(OH)_2 films made by electrochemical deposition.

References:

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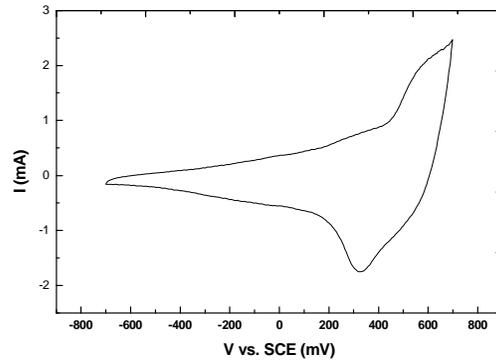


Fig. 1. Current –voltage characteristic of NiO_2 in 0.1N KOH

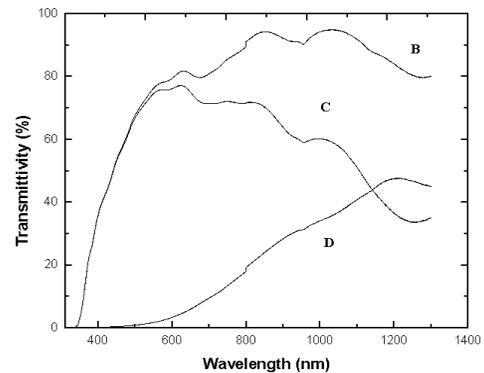
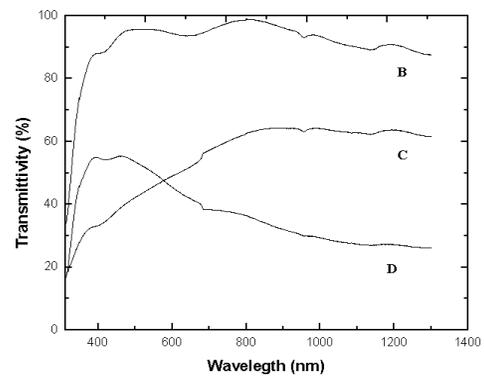


Fig. 2. Optical transmittivity in the bleached (B), coloured (C) states and their difference (D) for two Nickel oxide films sputtered from Ni (upper graph) and NiO targets (lower graph) respectively, in Ar/O_2 atmosphere.