ELECTROCHROMIC NICKEL-OXIDE-BASED FILMS WITH MINIMIZED BLEACHED-STATE ABSORPTANCE

E. Avendaño, A. Azens and C.G. Granqvist

Department of Materials Science,
The Ångström Laboratory, Uppsala University,
P.O. Box 534, SE-75121 Uppsala,
Sweden

Nickel oxide films show anodic electrochromism and are well suited for device operation in conjunction with tungsten oxide films. Reactive magnetron sputtering from a Ni target is awkward since it is magnetic, whereas "industrial nickel"—*i.e.* $Ni_{93}V_7$ or $Ni_{80}Cr_{20}$—is much better from a deposition perspective. However oxide films based on these materials, as well as pure Ni oxide, appear yellow-brownish in their fully bleached state due to optical absorption at wavelengths below 450 nm. This feature limits the usefulness of electrochromic Ni-oxide-based films in applications such as architectural "smart" windows and visors for motorcycle helmets. Our paper reports detailed physical and electrochemical data on reactively dc magnetron sputtered electrochromic films of Ni oxide with additives of Mg, Al, Si, V, Zr, Nb, Ag, or Ta. As shown in Fig. 1, additions of Mg, Al, Si, Zr, Nb, and Ta are able to lower the short-wavelength absorptance in the bleached state. This improvement takes place without noticeably affecting the appearance in the coloured state. Applications of these Ni-oxide-based films in devices of different kinds will be discussed.

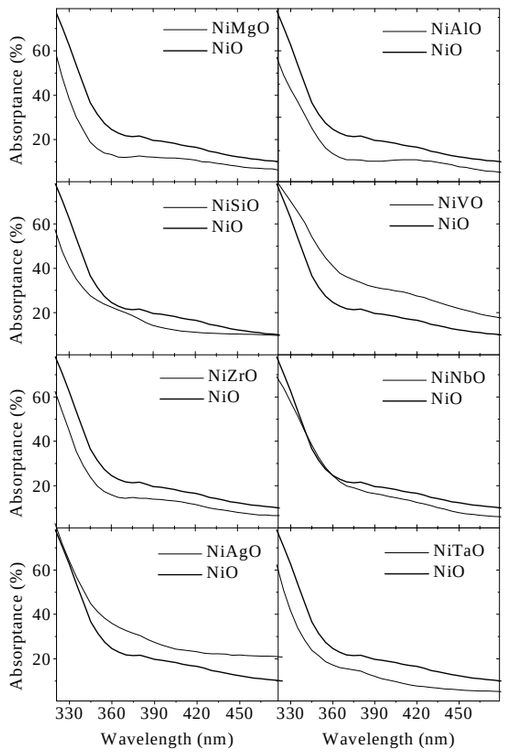

Fig. 1. Spectral absorptance of 200 nm thick electrochromic Ni-oxide based films in their bleached state.