

POLYMERIZATION CATALYSIS, FLEXIBLE POLYMER
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Effect of oxygen partial pressure on electrochromic properties of WO₃ thin films

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In modern years, there has been an enormous interest in electrochromic technology, which triggered the designing and fabrication of efficient electrochromic devices (ECD) which work on the phenomena of electrochromism, in which a reversible optical modulation in the materials can be achieved by intercalation/deintercalation of small cations and electrons by the application small electric field. Tungsten trioxide (WO₃) is one among the various EC transition metal oxides recognized as best EC material in thin film form. It exhibits large optical modulation, good durability, stability, low power consumption for the prepared ECDs. WO₃(Transparent)+xH⁺+xe⁻+HxWO₃ (Blue). In the present work, WO₃ thin films were prepared by electron beam evaporation technique at various oxygen partial pressures (PO₂) ranging from 2×10⁻³ to 2×10⁻⁵ mbar and at the substrate temperature of 250°C. The films were deposited onto well cleaned glass, ITO coated glass and silicon substrates. The influence of oxygen partial pressure on the growth, morphology, optical and electrochromic properties has been investigated. The XRD studies revealed that the phase transformation taken place from orthorhombic to monoclinic with respect to PO₂ from 2×10⁻³ to 2×10⁻⁵ mbar. The maximum optical bandgap of 3.28 eV was obtained for the films deposited at 2×10⁻⁵ mbar and decreased to 2.66 eV for the films deposited at 2×10⁻³ mbar. The coloration efficiency of WO₃ films at the wavelength of 550 nm were found to be 50.84, 29.56 and 24.95 cm²/C for the films deposited in the PO₂ of 2×10⁻³, 2×10⁻⁴ and 2×10⁻⁵ mbar respectively.

Biography

K V Madhuri is working as an Associate Professor in the Department of Science and Humanities, VFSTR University, Guntur, India. She is also an Associate Dean, Research & Development in VFSTR Deemed to be University. She has received her PhD at Sri Venkateswara University, Tirupati, India in 2003. She had worked as a Post-doctoral Fellow at Universite de Moncton, New Brunswick, Canada from 2003-2005. Her studies involve the preparation and characterization of transition metal oxide thin films and their applications in chromogenic devices and gas sensors. She has contributed many research papers in national/international journals of repute. She also delivered invited lectures in reputed institute and conferences in India and abroad.

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