P V Ashrit et al., J Material Sci Eng 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.037

Nanostructure control in tungsten trioxide (WO_3) thin films for improved electochromic properties

P V Ashrit, Gisia Beydaghyan and **B Abdel Samad**
Université de Moncton, Canada

Transition metal oxide thin films showing very efficient electrochromic properties have become increasingly popular due to their application potential in various forms of smart systems. The reversible coloration that can be induced in these materials, especially in thin film form, via the application of a small electric field provides a facile and interactive way to control the coloration. Tungsten trioxide (WO_3) thin films are by far the best known candidates for these applications.The electrochromic coloration occurs through a reversible reaction such as the one shown below:

$$WO_3 + xe^- + xLi^+ \leftrightarrow Li_xWO_3$$
(Transparent) (Blue)

Upon the application of a small electric field x number of ions (lithium, for example) and electrons are injected into the transparent WO_3 to transform it into blue colored bronze (Li_xWO_3) thus giving the electrochromic coloration. There are stringent requirements on the optical and electrical properties of these films for their efficient and stable electrochromic (EC) operation. These thin films need to show high efficiency coloration under ion intercalation as well as a high mixed ion/electron conductivity. In this work we have carried out the preparation of the thin films of WO_3 with the specific goal of controlling their nanostructure to optimize their mixed conductivity. High pressure sublimation and condensation as well as the glancing angle deposition (GLAD) methods have been used to induce a controlled nanostructure. Lithium ion diffusion is measured by electrochemical methods. The optimum nanostructure that is apt for the EC application of these films is reported.

Biography

P V Ashrit is a Professor of Physics and the Director of Thin Films and Photonics Research Group (GCMP) at Université de Moncton in Canada. He has been working in the area of thin films, especially of chromogenic (electrochromic, photochromic, thermochromic) materials for over 25 years. His present interest is in inducing various types of nanostructure in these films in order to enhance their chromogneic performance. He has been awarded the prestigious R3 Innovation Award for Excellence in Applied Research by the New Brunswick Innovation Foundation (NBIF).

pandurang.ashrit@umoncton.ca

Notes: