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### Improved electrochromic performance of WO<sub>3</sub>/PPy thin films

Anamika Vitthal Kadam

D Y Patil College of Engineering and Technology, India

The electrochromic properties of organo-inorganic hybrids of WO<sub>3</sub>/PPy thin films have been synthesized with a two-step process successfully. The WO<sub>3</sub> layer was prepared by electrodeposition technique on conducting glass substrate (indium doped tin oxide-ITO) followed by thermal treatment and polypyrrole thin films were deposited using chemical bath deposition (CBD) technique. The structural, morphological, optical and electrochromic responses of WO<sub>3</sub>, PPy and WO<sub>3</sub>/PPy films are described. To study the electrochromic (EC) properties of the as deposited films, cyclic voltammogram (CV), chronoamperometry (CA), chronocoulometry (CC) and optical modulation were performed. The kinetic investigation (response time) and coloration efficiency were found to be enhanced appreciably. The WO<sub>3</sub>/PPy shows improved EC performance than their solitary act.

anamikasonavane@rediff.com

### Synthesis and characterization of Zn-substituted lithium cobalt ferrite using sol-gel autocombustion for a cathode material in lithium ion batteries

Mukhtar Ahmad<sup>1</sup>, Nasir Mehboob<sup>2</sup> and Muneer Hussain<sup>2</sup>

<sup>1</sup>COMSATS Institute of Information Technology, Pakistan

<sup>2</sup>Riphah International University, Islamabad, Pakistan

Li-ferrites are scientifically advanced smart materials and their structural and magnetic properties can be modified for a particular application by controlling the synthesis conditions and better choice of metal ions. In the present work, single phase samples of lithium zinc ferrites with general formula LiCo<sub>0.5-x</sub>Zn<sub>x</sub>Fe<sub>2</sub>O<sub>4</sub> (where 0 ≤ x ≤ 0.5) were synthesized by sol gel auto combustion method. To study the mass loss (%) and endothermic and exothermic reactions as a function of temperature, thermal analyses (TGA/DTA) were carried out for a selected sample. The structure and morphology for all the samples were studied by X-ray diffraction (XRD) and scanning electron microscopy (SEM). The XRD patterns confirm that all the samples retain phase purity of spinel structure when substituted with Zn contents in place of Co ions. However, the structural parameters such as lattice constant, cell volume and X-ray density were altered after Zn-substitution into the spinel lattice. The SEM images show that the grain size estimated by line intercept method was found to be unchanged by substituting Zn ions because the values of ionic radii of Zn and Co are almost equal. The M-H loops for all the samples show a low value of coercivity (a few hundred oersteds) which confirms the soft magnetic nature of these ferrites. Moreover, the values of saturation magnetization and remanence are in good agreement with earlier reported values for this structure. The observed parameters suggest that these ferrites may be potential candidates for a cathode material in Li-ion batteries, core materials and microwave devices.

ahmadmr25@yahoo.com  
nasirmehboob@yahoo.com