

Oral Presentations

Electrochemical properties of Sol-gel WO_3 films single doped with Ti and Co-doped with Ti and Zn

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Abstract

WO_3 nanoparticles single doped with Ti ($\text{W}_{1-x}\text{Ti}_x\text{O}_3$) and co-doped with Ti and Zn ($\text{W}_{1-x}\text{Ti}_{x-y}\text{Zn}_y\text{O}_3$) have been prepared, onto FTO/glass substrate. Preparation of films was done using wet chemical method (dipping in a sol-gel). The molar concentration of Ti into $\text{W}_{1-x}\text{Ti}_x\text{O}_3$ ranges from 0-30 % in steps of 5%. Best electrochemical and electrochromic properties were observed for composition that has Ti nominal concentration of 5 % ($\text{W}_{0.95}\text{Ti}_{0.05}\text{O}_3$). This was evidenced from measurements of cyclic voltammetry (CV), chronoamperometry (CA), and transparency during CA. The composition that gives best electrochemical and electrochromic properties ($\text{W}_{0.95}\text{Ti}_{0.05}\text{O}_3$) was used to prepare WO_3 nanocrystallite films co-doped with Zn for the first time ($\text{W}_{0.95}\text{Ti}_{0.05-y}\text{Zn}_y\text{O}_3$). The Zn molar concentration in these films varied from 1-5%. From CV, CA, and transparency measurements, the best electrochemical and electrochromic properties were observed for films that contains 3% of Zn ($\text{W}_{0.95}\text{Ti}_{0.02}\text{Zn}_{0.03}\text{O}_3$). Moreover, this film was found to have better electrochemical and electrochromic properties than single doped WO_3 film ($\text{W}_{0.95}\text{Ti}_{0.05}\text{O}_3$). In addition, higher electrochemical stability was observed for co-doped films.