

ICoFM 2016-58: Influence of Solution Deposition Rate on Properties of V_2O_5 Thin Films Deposited by Spray Pyrolysis Technique

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Abstract: Vanadium oxide (V_2O_5) thin films were deposited on glass substrates by using a cost-efficient spray pyrolysis technique. The films were grown at 350°C through thermal decomposition of VCl_3 in deionized water with different solution spray rates. The high resolution X-ray diffraction results revealed the formation of nanocrystalline films having orthorhombic structures with preferential orientation along (101) direction. The spray rate influenced the surface morphology and crystallite size of the films. The crystallite size was found to increase whereas the micro-strain was decreased by increasing the spray deposition rates. The increase in crystallite size and decrease in the macrostrain resulted in an improvement in the films' crystallinity. The UV-Visible spectroscopy analysis indicated that the average transmittance of all films lies in the range 75-80%. The band gap of V_2O_5 film was decreased from 2.65 to 2.46 eV with increase of the spray deposition rate from 5 ml/min to 10 ml/min.

Keywords: V_2O_5 , Thin films, deposition rate, spray pyrolysis