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Effect of metal-ions (Sn and Li) doping on the structural, optical and gas sensing properties of In_2O_3 nanocrystalline thin films

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Metal oxide thin films have been used for a variety of applications, including photovoltaic devices, gas sensors, solar cells and so on. In comparison with the existing transparent conducting oxide (TCO) materials, indium oxide (In_2O_3) has been extensively studied because of its good optical transparency in the visible region, wide optical band gap and high electrical conductivity. Various techniques viz., sol-gel, pulsed laser deposition (PLD), molecular beam epitaxy (MBE), etc. has been used to deposit thin films of In_2O_3 in the literature. Chemical spray pyrolysis has been proved to be a significant and inexpensive technique wherein the properties of thin films can be engineered by altering the different process parameters associated with the spray equipment such as substrate temperature, substrate-nozzle distance, solution concentration, etc. It also offers advantages over other growth techniques such as low cost of the spray unit and raw materials and flexibility of doping elements into the parent system. In_2O_3 is a TCO material, possessing both direct and indirect optical band gap as well as a very low value of electrical resistivity. Among the various methods used to study the properties of indium oxide thin film, metal ion doping is one process wherein the properties of the film can be enhanced by the choice of a suitable dopant element. We present the influence of metal-ions (Sn and Li) doping on the structural, optical, electrical and formaldehyde sensing properties of sprayed In_2O_3 thin films. Finally, a comparison has been made between these two metal ion dopings.

Biography

S N Pandey has completed his PhD from Avadh University. He is the Head of Department of Physics, Motilal Nehru National Institute of Technology, Allahabad, India. He has published more than 35 papers in reputed journals. He is recipient of UGC Research Award and many visiting fellowships. He is Life Member of many academic bodies/societies. He has supervised four PhD candidates.

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