

Structural, optical and electrical investigations of Al: ZnO nanostructures as UV photodetector synthesized by spray pyrolysis technique

One of the most important n-type semiconductor materials used for large numbers of optoelectronics applications is Zinc Oxide (ZnO). In this paper, an aluminum doped zinc oxide thin films have been prepared using spray pyrolysis technique over a 100 silicon based substrates. Morphological, structural, optical and electrical properties of the prepared thin films were characterized and intensively studied. Different aluminum contents of 1%–5% have been utilized to synthesis ZnO nanostructures. The x-ray diffraction method showed that films are crystalline in their structure with hexagonal quartzite phase. Further, FE-SEM methods approved a homogeneous surface morphology with emerging tiny particles as a result of increasing the aluminum concentration. The photoluminescence technique has been used to clarify films optical properties. A clear shift in energy band-gap from 3.26 eV to 3.23% has been resulted ...