TW-P010

Fluorine-Doping Effect on Structural and Optical Properties of ZnO Nanorods Synthesized by Hydrothermal Method

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Fluorine, the radius of which is close to that of oxygen, could be an appropriate anion doping candidate. A lower lattice distortion could be expected for F doping, compared with Al, Ga, and In doping. F-doped ZnO (FZO) and undoped ZnO nanorods were grown onto glass substrate by the hydrothemal method. The doping level in the solution, designated by F/Zn atomic ratio of was varied from 0.0 to 10.0 in 2.0 steps. To investigate the effects of the structure and optical properties of FZO nanorods were investigated using X-ray diffraction, UV-visible spectroscopy and photoluminescence (PL). For the PL spectra, the maximum peak position of NBE moves to higher energy, from 0 to 4 at.%. As the doping concentration increases, the maximum peak position of NBE gradually moves to lover energy, from 4 to 10 at.%.

Keywords: ZnO nanorod, Hydrothermal

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Influence of the Fluorine-doping Concentration on Nanocrystalline ZnO Thin Films Deposited by Sol-gel Process

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Wide band gap II-VI semiconductors have attracted the interest of many research groups during the past few years due to the possibility of their applications in light-emitting diodes and laser diodes. Among the II-VI semiconductors, ZnO is an important optoelectronic device material for use in the violet and blue regions because of its wide direct band gap (Eg ~3.37 eV) and large exciton binding energy (60 meV). F-doped ZnO (FZO) and undoped ZnO thin films were grown onto quartz substrate by the sol-gel spin-coating method. The doping level in the solution, designated by F/Zn atomic ratio of was varied from 0 to 5 in 1 steps. To investigate the effects of the structure and optical properties of FZO thin films were investigated using X-ray diffraction (XRD), UV-visible spectroscopy, and photoluminescence (PL). In the XRD, the residual stress, FWHM, bond length, and average grain size were changed with increasing the doping concentration. For the PL spectra, the high INBE/IDLE ratio of the FZO thin films doping concentration at 1 at.% than the other samples.

Keywords: Fluorine-doped ZnO, Sol-gel, Spin-coating