Study on the structural and optical properties of Ga-doped ZnO nanorod arrays

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Highly oriented Ga-doped Zinc Oxide (ZnO) nanorod arrays have been prepared on a ZnO-buffered silicon substrate in an aqueous solution which is a mixture of methenamine ($C_6H_{12}N_4$), gallium nitrate hydrate ($Ga(NO_3)_3.xH_2O$) and zinc nitrate hexahydrate ($Zn(NO_3)_2.6H_2O$). The microstructures of nanorod arrays were analyzed through different characterization techniques including XRD, XPS and FESEM. The experimental results show that Ga-doping level plays a key role in the formation of ZnO nanorods, while the concentration ratio of zinc nitrate hexahydrate to methenamine also affects the morphology of nanorods. The effects of Ga-doping level on the optical properties of ZnO nanorod arrays were characterized using He-Cd laser as excitation source and discussed in detail later. These Ga-doped ZnO nanorod arrays may be used in electronic and optoelectronic applications.