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Effect of Li concentration on the optical band gap of undoped and Li doped ZnO nanorods

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Li doped and undoped Zinc oxide thin film by sol-gel method and spin coated on glass substrate, and the effect of doping on structural, optical and stress properties have been investigated. X-ray diffraction analysis showed that all the films are polycrystalline with hexagonal wurtzite structure. For a low amount of Li up to 12%, the texture coefficient increases with the Li amount ensuring an improvement of the c-axis orientation and the crystallinity. The crystallite size seems slightly affected and ranged in the nanometer range. Beyond this, Li amount value, the texture coefficient decreases drastically showing deterioration in the growth of ZnO along c-axis. Scanning Electron Microscopy (SEM) images show that the morphology of films was highly influenced by Li incorporation. For Li amount exceeding 12%, SEM images show the appearance of some cracks. The optical results revealed an improvement of the total transmission when increasing the Li amount up to 12%. A linear decrease of band gap energy with the Li content was observed. The stress was calculated and founded depending on the Li amount analogously to the band gap energy. Thus, the band gap energy and the stress are correlated.

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