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Hydrothermal synthesis and optical properties of Ni doped ZnO hexagonal nanodiscs

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ABSTRACT

Single crystalline Ni-doped ZnO hexagonal nanodiscs are successfully synthesized. Zinc acetate, nickel nitrate, sodium hydroxide and poly (vinyl pyrrolidone) (PVP) were mixed together and transferred to a 100 ml Teflon-lined stainless steel autoclave which kept at 150 °C for 24 h. The morphology and microstructure were determined by field emission scanning electron microscopy (FE-SEM), X-ray diffraction transmission electron microscopy (TEM), energy-dispersive X-ray spectroscopy (EDX) and photoluminescence (PL) spectroscopy. The investigation confirmed that the products were of the wurtzite structure of ZnO. The doped hexagonal nanodiscs have edge length 30 nm and thickness of 45 nm. EDX result showed that the amount of Ni in the product is about 12%. Photoluminescence of these doped hexagonal nanodiscs exhibits a blue shift and weak ultraviolet (UV) emission peak, compared with pure ZnO, which may be induced by the Ni-doping. The growth mechanism of the doped hexagonal nanodiscs was also discussed.

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