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Synthesis and optical properties of Ce-doped ZnO hexagonal nanoplatelets

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ABSTRACT

Single crystalline Ce-doped ZnO hexagonal nanoplatelets are successfully synthesized. Zinc acetate, cerium nitrate, potassium hydroxide and poly vinyl alcohol were mixed together and transferred to a 100 mL Teflon-lined stainless steel autoclave kept at 150 °C for 24 h. The obtained precipitant is calcined at 600 °C. 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 nanoplatelets have edge length 25 nm and thickness 11 nm. EDX result showed that the amount of Ce in the product is about 15%. Photoluminescence of these doped hexagonal nanoplatelets exhibits a blue shift and weak ultraviolet (UV) emission peak, compared with pure ZnO, which may be induced by Ce-doping. The growth mechanism of the doped hexagonal nanoplatelets was also discussed.