

Effect of Temperature of ablation media on Photoluminescence of Zn-ZnO Inorganic/ SDS Organic Nanocomposite Materials synthesized by Laser Ablation

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Abstract

Materials at the nanoscale have shown their importance in the fabrication of electronic, optoelectronic, sensing, and energy storing and harvesting devices. They act also vital role in the fluorescent tagging, fluorescence microscopy and imaging. Fluorescent nanoparticles having intense emission in the visible region, mostly in the green have been found suitable for these applications. Zinc oxide is one of the best fluorescent nanoparticles with photo stable, and solution processable behavior. Zinc-Zinc oxide inorganic/ SDS organic Nanocomposite materials with enhanced green emission is synthesized by pulsed laser ablation of Zn rod in the aqueous solution of Sodium Dodecyl Sulphate (SDS) at different media temperature. Zn rod was placed on the bottom of glass vessel containing aqueous solution of SDS at different concentrations (0.1, 10 and 100 mM) and was allowed to ablate with focused output of 1064 nm from pulsed Nd:YAG laser operating at 40 mJ/pulse energy, 10 ns pulse width and 10 Hz rep. rate for two hours. Solution of the ablation media was kept fixed at RT (20 degree C), 50 degree C and 90 degree C during ablation. Photoluminescence spectra of as synthesized colloidal solution were recorded using 514.5 nm of Ar ion laser as excitation source and Acton 0.5 M monochromator with PMT detector for recording the emission spectra. It is observed that fluorescent efficiency of the synthesized nanomaterial increases linearly with temperature and excitation energy, while varies slightly from linearity with SDS concentration for the samples synthesized at 50 degree C temperature. UV-visible absorption, X-ray diffraction, TEM and FTIR characterizations are also done for all the samples. Mechanism of the synthesis of the Nanocomposite materials is discussed in brief.

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