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STUDIES ON UV ABSORPTION AND VISIBLE EMISSION OF *La* DOPED *ZnS*

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Semiconductor nanoparticles have steadily drawn attention during the last few years due to their new-fangled optical, physical and electrical properties than their bulk particles**.** Zinc sulphide (ZnS) is a very important wide band gap semiconductor belonging to II-VI semiconductor type. It has a wide band gap of 3.7 eV at room temperature, and is primarily a compound for UV light emission. The luminescence properties of ZnS strongly depend on the intrinsic and extrinsic defects. To study the optical properties of ZnS, lanthanum (0.1, 0.5 and 1.0 mol%) doped ZnS nano-powder was successfully synthesised by co-precipitation method. Lanthanum (La) is used in the preparation of advance materials with superlative optical and structural properties. Doping with such materials would enhance unique properties of the host material. Samples prepared were characterized using Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), UV absorption spectroscopy and photoluminescence. In FTIR spectra, characteristic peaks observed at 465 and 600 cm^{-1} are due to stretching bond of Zn-S, while XRD analysis confirms the cubic zinc blend structure of ZnS. According to the Debye Scherer's formula, the crystallite size was found to be 2.89 nm. The optical absorption edge was calculated using Tauc equation. The optical energy band gap is observed to increase with La doping which may be due to quantum confinement effect. The emission broad peak centred at 483 nm was due to Zn vacancies. Hence, the blue-green emission may be due to some self-activated defect centres related to Zn vacancies. The intensities of the peaks of ZnS:La were less than those of the undoped ZnS. The reduction in the emission intensity is due to the increase in the non-radiative recombination process. Thus, samples prepared show good optical properties, and they are useful for opto-electronic applications.

Keywords: La, Visible emission, ZnS, Zn-vacancy

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