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Visible WGM emissions from rare earth ion doped ZnO microspheres FABITHA K, Research scholar, M S RAMACHANDRA RAO, Professor — ZnO is known to be an ideal candidate for short wavelength range opto-electronic device applications due to its wide and direct bandgap (3.37 eV) and high excitonic binding energy (60 meV). Apart from the UV emission at ˜380 nm (free exciton emission) ZnO also possesses a broad emission band centered at ˜530 nm which is expected to be originated from the oxygen vacancy (Vo) defects. In rare earth (RE) ion doped ZnO, emissions originate from the 4f levels of RE ions will be obtained in addition to the characteristic emissions of ZnO. Small micro/nanostructures made of ZnO with high crystalline quality show unique characteristics in light emission, especially in lasing applications. A micro/ nanostructured ZnO crystal generally has a wurtzite structure with a natural hexagonal cross section, which serves as a WGM lasing micro cavity owing to its high reflective index (∼2). However, there exists a potential optical loss at corners of hexagons; therefore, an isotropic structure like spheres may be a better candidate to achieve efficient light confinement. In our work, highly smooth micro spheres with different diameters were grown. Raman spectroscopy measurements confirm the hexagonal wurtzite structure of ZnO, SEM and AFM studies shows the smooth surfaced spheres. WGM lasing characteristics of ZnO spheres have been investigated using optical pumping with 488 nm laser in a micro-PL system. Details of the results will be presented.

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