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Structural Analysis of ZnO Nano-phosphors Fabricated by Pulsed Laser Ablation under the Glow Discharge Condition QIANG MA, TEGUH ENDAH SARASWATI, AKIHISA OGINO, MASAAKI NAGATSU, Shizuoka University — Zinc oxide (ZnO) has many potential applications in photoelectric devices, since it has a wide band gap of 3.37 eV and a large exciton binding energy of 60 meV at room temperature. Especially ZnO nanostructures exhibiting unique physical, chemical and optical properties show great promise for nanoscale photoelectric devices. However, if the particle size is reduced, the specific surface area increases and the density of atoms with unsaturated bonds (i.e., surface defects) increases in the surface layer, which can act as trapping centers and quench the excitonic luminescence of ZnO. Hence, understanding the role of defects and controlling their spatial distribution inside nano-structured ZnO are extremely important for the luminescence efficiency of nano-sized phosphors in many applications. In this letter, ZnO nanophosphors were produced by a Pulsed laser ablation. A direct current glow discharge was used to introduce the oxygen radical atoms/ions into the growth process of nanophosphors. The results of Cathodluminescence (CL) spectra show that the ultraviolet (UV) peak intensities of ZnO nanophosphors with a fine crystalline structure were enhanced. These results imply that the growth of the oxygen-related defects is confined under the plasma circumstance.

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