# Intense Photoluminescence of slightly ZnO doped $SiO_2$ matrix

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In this paper, we report the optical investigation of ZnO-doped monolithic $SiO_2$ matrix elaborated by sol-gel method.
The first step of this procedure consists in the mixing of precise amounts of tetraethoxysilane (TEOS), ethanol and deionised water. A second solution was obtained by mixing acetone, deionised water and hydroxide ammonium stirred for several hours. The two solutions were then mixed and shaken.
Two different samples were elaborated. The first, S1, is obtained with doping the final solution by a little amount of ZnO fine powder which is stirred up until gelation and dried for several weeks. The second one, S2, is elaborated from the part of the solution containing only the smallest ZnO aggregates.
X-ray diffraction patterns do not reveal any diffraction lines due to ZnO. This fact is interpreted by the small quantity of ZnO and the strong amorphous behaviour of the $SiO_2$ matrix.
Photoluminescence (PL) excitation measurements done at room temperature, reveal band gaps of 3.42 and 3.52 eV for S1 and S2 respectively, corresponding to mean grain sizes of 27 and 21 nm. PL spectra do not exhibit the well known green band. Unbound ligands at ZnO surface are passivated by surrounding media.
A particularly strong luminescence is shown on PL spectra, ~~and~~ explained by the strong coupling between electromagnetic field of light and exciton in ZnO nanoparticles. Photoluminescence spectra, obtained with different excitations, showed an inhomogeneous broadened emission band and a blue-shift of their maxima.