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Effect of Ag nanoparticles on the luminescence of Tb doped sol-gel silica

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Abstract content
   (Max 300 words)

Much attention has been paid to the study of optical properties of nanometre size particles dispersed in glass matrices from the viewpoint of scientific interest. If such ultrafine particles can be uniformly dispersed in a solid matrix, the stability of the particles increases and the solid can be handled easily. Recently, active research has been focused on the optical properties of rare-earth ions near metal nanoparticles, since luminescence may be increased due to local field enhancement around the rare earth ions which could lead to applications in optoelectronics devices. However, the addition of metal nanoparticles can also lead to quenching of the luminescence. A basic interest in these composite materials is to see under what conditions the emission yield, which is a balance between emission and quenching, can be optimized. Tb doped silica has been synthesized using the sol-gel method and emits green light of wavelength 544 nm. X-ray diffraction (XRD) results show that these samples remain amorphous even after annealing at 1000˚C. In other samples, silver nitrate was added during the synthesis. The presence of silver nanoparticles in the silica matrix was confirmed by XRD analysis and the average crystallite size was found to be 20-30 nm by the Scherrer equation. The effect of the silver nanoparticles on the luminescence of the Tb ions will be presented.

Reference
[1] Tomokatsu Hayakawa, S. Tamil Selvan and Masayuki Nogami 1999 Appl. Phys. Lett. 74 1513

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