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Comprehensive study of ZAIS Nanocrystals photo-physics

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AgInS₂-ZnS (ZAIS) nanocrystals are semiconductor phosphors generally used for a variety of applications in the visible domain such as LED lighting, bio-imaging or photovoltaics. This communication is about photo-physics of such a nanoparticle. Those particles behave without quantum confinement, their luminescence has its origin in donor-acceptor pair (DAP) transitions. In a first step, lifetime of the emissions measured by time resolved spectroscopy will be exploited in order to describe the three radiative mechanisms acting either on surface or in the core of the particle. In a second time, we will combine lifetime and quantum yield measurements to quantify radiative and non-radiative recombination rates. This step is a very powerful method for understanding electronics processes. Indeed, those values associated with other material characterizations (optical absorption and XPS) allows to determine the relationship between structural properties and emission processes. As consequence, we will establish the direct effect of disorder on non-radiative recombinations and identify the element defects involved in the photoluminescence. All these experimental results give a complete analysis of electronics processes occurring in a sub-10nm nanoparticle.

Biography

Graduated from the French, Ecole Nationale Supérieure d'Ingénieur Electricien de Grenoble, Electrical engineering school in 1982. Work as Engineer in Alcatel and Crismatec companies before to enter in CEA (French Governmental Research Center) in 1988. Involved in materials for electromagnetism applications during 8 years, then was responsible of Optical Materials Laboratory at CEA Tours, for 4 years. In 2000, I am promoted Manager of the Material Department in CEA Grenoble. In 2008, I became Senior Expert in the Optical Department.

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