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Rare Earth doped Silver Tungstate for photoluminescent applications

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Abstract

Luminescent materials of different emission colors are of great interest for development of new or more efficient optical devices. Although many materials have been reported using different approach, green synthesis and nanosized rare earth doped phosphors of high color rendering is still very limited. This paper describes the structural and luminescence properties of different rare earth doped α -Ag₂WO₄. The nanophosphors α -(Ag_{1.97}RE_{0.01})WO₄ (RE = Pr, Sm, Eu, Tb, Dy and Tm) were prepared using a simple, fast and cheap coprecipitation methodology. The results revealed that the samples have single phase with orthorhombic symmetry of *Pn2n* space group. X-ray Photoelectron Spectroscopy (XPS) properties of these phosphors are characterized for the first time. The phosphors show their characteristic emission colors under ultraviolet excitation due to the efficient energy transfer from WO₄²⁻ group to rare earth ions. Also, the α -(Ag_{1.97}RE_{0.01})WO₄ system offers the possibility of color tuning by changing only the RE³⁺ dopant instead of altering the host. The photoluminescence properties show the suitability of these inorganic phosphors for solid-state lighting optical devices and for biological applications due to the low toxicity of silver compounds.

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