Study reports on optical materials based on gadolinium aluminate garnet

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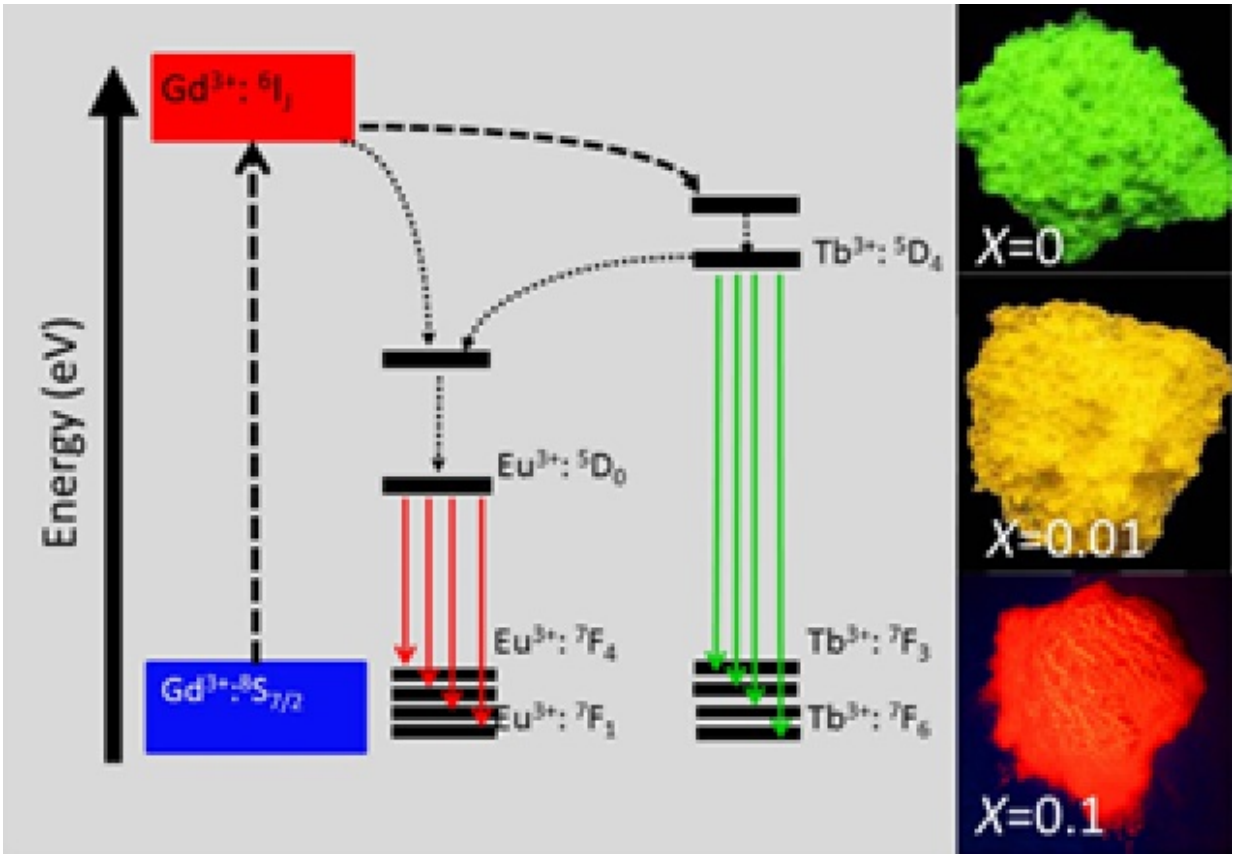

Possible pathways of energy transfer (left) in the [(Gd0.8Lu0.2)0.9−xTb0.1Eux]AG phosphor and digital pictures (right) showing colour-tuneable emission through the energy transfer (excitation: 275 nm). Credit: Science and Technology of Advanced Materials

Japanese scientists have reviewed recent progress in advanced optical materials based on gadolinium aluminate garnet (GAG), while pointing out the knowledge gaps that need to be filled to improve their optical performance.

Their article, published in the open access journal *Science and Technology of Advanced Materials*, investigates the conditions in which GAG materials perform best. GAG is a synthetic material used in optics and crystal growth, as seeds to grow large crystals of similar materials.

Rare-earth aluminate garnets are an important family of multi-functional ceramic materials. They are useful in phosphors and lasers – often with medical applications such as cancer diagnosis and treatment. Researchers have tried to improve the chemical stability and luminescence of these materials and to understand their novel emission features.

In their review, Ji-Guang Li and Yoshio Sakka, of Japan's National Institute for Materials Science, discuss the ways to stabilise the GAG lattice and its performance in scintillators and "down-conversion phosphors", where high-energy photons are converted to low-energy ones.

Anti-site defects, where atoms of different types exchange their positions, are common in these materials. These can have profound effects on emissions as the atoms interact with excited electrons. This needs to be better understood, say the authors, in order to improve the overall performance of this class of optical materials.

More information: Ji-Guang Li et al. Recent progress in advanced optical materials based on gadolinium aluminate garnet (Gd Al O) , *Science and Technology of Advanced Materials* (2016). DOI: 10.1088/1468-6996/16/1/014902

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