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Intracellular Imaging Applications of Rare Earth doped Multifunctional Metal Oxysulphide Nanomaterials¹ JULIO C. AVALOS, C. MIMUN, G.A. KUMAR, D.K. SARDAR, Univ of Texas, San Antonio — Nanomaterials with multiple imaging features have a lot of attention in the medical industry where there is always a high demand for contrast agents that can give more information about the intracellular level mechanisms. Nanomaterials with specific size, shapes, surface functionalities, and properties are needed for intracellular level optical imaging. Rare-earth doped inorganic nanophosphors are the best choice for these applications due to their several advantages such as excellent optical properties, size and composition control, etc. Though there are several efficient rare earth based halide nanophosphors, an efficient halide free nanophosphor is still lacking. In this work we are presenting a series of rare earth doped metal oxysulphide host, $M_2O_2S:Re$ ($M=Gd,Y,La$, $Re=Yb,Er,Tb,Eu,Nd$), as an alternate host with fluorescence efficiency equal or even higher than that of halides. Following a detailed study on the optical and magnetic properties we evaluated the potentiality of this material as nanoscale multifunctional contrast agents by *in vitro* and *in vivo* animal experiments. Our experimental results show that by adjusting the dopant concentrations and host structures the material property can be tuned over a wide range for multimodal imaging applications and optimized compositions can be achieved for high contrast intracellular imaging.

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