Eu^{3+}-doped $NaBi(MoO_4)_2$ nanoparticles as contrast agents for bioimaging

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Abstract
Lanthanide doped nanoparticles (oxides, fluorides, molibdates, etc.) have been widely investigated as probes for luminescent bioimaging [1]. On the other hand, the high atomic number (Z) of Bi (83) confers to the Bi compounds a strong capacity for X-ray attenuation and therefore could be used as probes for X-ray computed tomography (CT) [1]. Therefore, Eu and Bi containing nanoparticles could find applications as dual-mode probes for both, luminescent imaging and CT. In this work, we reported for the first time in the literature, a one-pot method for the synthesis and functionalization with polyacrylic acid (PAA) of uniform Eu^{3+}-doped $NaBi(MoO_4)_2$ nanoparticles [2]. The luminescent properties of such nanoparticles are evaluated as a function of the Eu^{3+} doping level finding, in all cases, an intense red emission. The X-ray attenuation properties of the nanoparticles have been also analyzed, which showed better X-ray attenuation properties than iohexol (commercial computed tomography contrast agent). These nanoparticles could be well dispersed in water and 2-(N-morpholino)ethanesulfonic acid monohydrate medium (physiological pH simulator). Finally, the cell viability and *in vivo* toxicity using *C. Elegans* as a model of such phosphor have been evaluated, finding no significant toxicity up to a NPs concentration of 100 $\mu g \cdot mL^{-1}$ (within the range required for most *in vivo* applications) being, therefore, excellent candidates for their use as bimodal probes for CT and luminescent imaging, the later being illustrated using the *C. Elegans* model.

References

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Figures

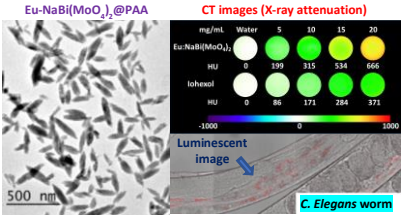

Figure 1: TEM image of the nanoparticles, X-ray attenuation phantom images and X-ray attenuation values vs. contrast agent concentration compared with iohexol (commercial contrast agent) and localization of the nanoparticles (in red) through the intestine of the worm.