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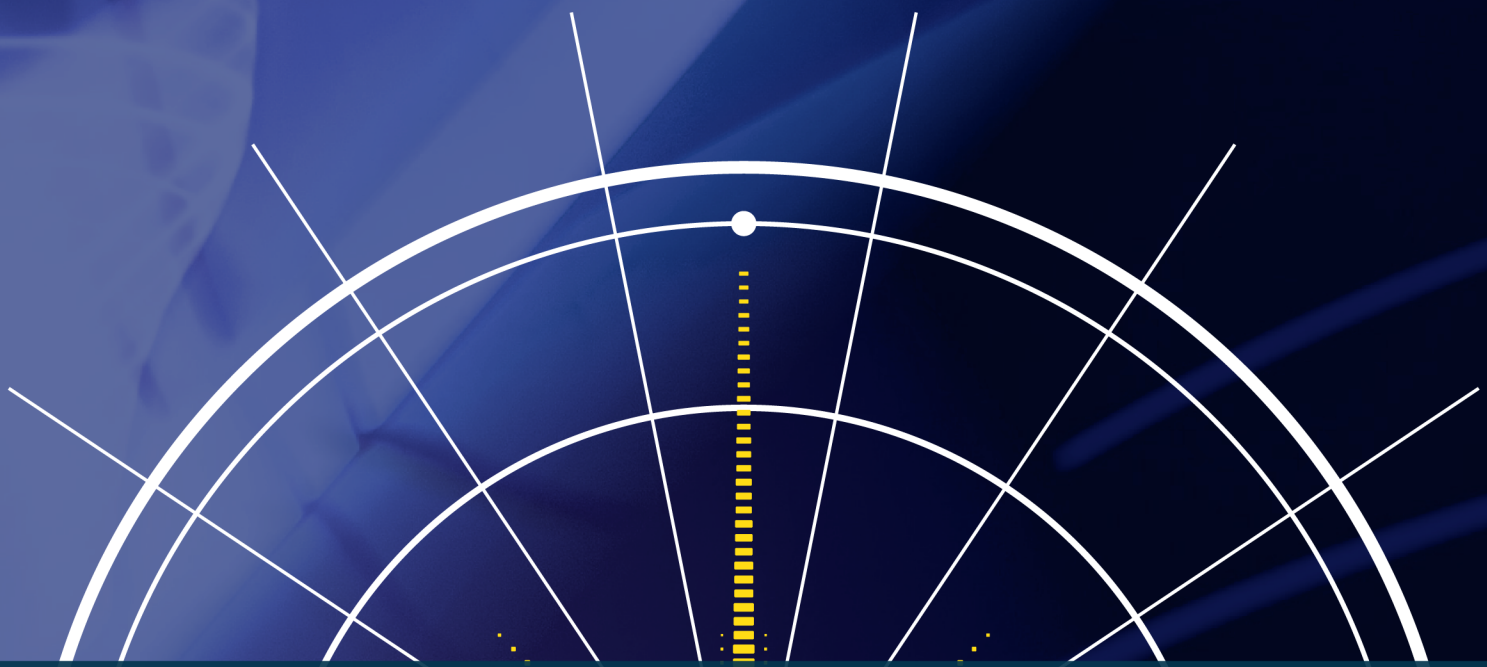
ABSTRACT BOOK



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Oral Communication

Understanding the plasmon enhanced upconversion in translucent films through nanofocused X-ray fluorescence

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Upconverting nanoparticles (UNPs) have gained more attention for their wide applications in photovoltaics and bioimaging. However, their intrinsic low efficiency is challenging for further developments. In this study, YF_3: Yb^{3+}, Er^{3+} 100 nm nanoparticles (UNPs) along with ~15 nm Spheric Gold Nanoparticles (AuNPs) were synthesized and incorporated into Hydroxy-Propyl-Methyl Cellulose (HPMC) thin, translucent films. These films were prepared by the addition of an homogeneous dispersion of the UNPs in HPMC aqueous solution which received the posterior addition of the AuNps previously prepared via Turkevich method. The presence of the gold nanoparticles induced an enhancement of 3 orders of magnitude in the upconversion efficiency. This huge plasmon induced increase indicated that the UNPs and AuNPs are very close.
These composites were mapped with nanofocused X-Ray fluorescence in the Carnauba beamline using 13657 eV irradiation and detecting Er (6950 eV), Yb(7415 eV) and Au (9713 eV) L_1 fluorescence. Serendipitously, despite Au having higher affinity to softer Lewis bases, like those present in the polymer chain, the majority of the AuNPs were found around the agglomerates of UNPs. It is not clear why Au bonds with the fluoride particles, but it is evident that this proximity is responsible for the enhancement of up-conversion luminescence. These remarkable results provide a gateway to design more efficient upconverting materials, opening the way to its application on a plethora of fields.

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Keywords:

Upconversion, plasmonic, nanoparticle