

Nanomaterials: from Random Lasers to Nanobiophotonics

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Nanomaterials are everywhere, many found in nature, and perhaps most of them man-made. In this talk, I shall describe how engineered nanomaterials have been exploited from basic studies to applications, with examples in three areas: random lasers, nonlinear optics and nanobiophotonics.

Random lasers are a class of lasers in which there are no mirrors, and the optical feedback is provided by scatterers made of nanomaterials. I will exemplify with organic random lasers with TiO₂ nanoparticles, nanoparticles based rare earth doped random lasers and plasmonically enhanced random lasers.

Nonlinear Optics is a well-developed field of photonics and the role of plasmonics with metallic nanoparticles have been well studied. I will briefly describe some of our studies with nonlinear optics in gold nanorods.

Finally, I will describe how nanomaterials are impacting biophotonics, a field known as nanobiophotonics. In particular, I will report on applications in nanodentistry, both for imaging with optical coherence tomography and nanothermometry.