



Photonic applications of Organic-Inorganic Hybrids. From direction modulated photoluminescence to IR photoactivated processes

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Organic–inorganic hybrids (OIH) allow the fabrication of materials with tunable attributes offering modulated properties. The synergy between the intrinsic characteristics of sol–gel derived hosts and the luminescence features of trivalent lanthanide ions leads to innovative applications.

In this talk we will show OIH featuring simultaneous iridescence and light emission [1]. They are obtained through liquid crystal self-assembly of cellulose nanocrystal-template silica. The cellulose nanocrystal film structure comprises multi-domain Bragg reflectors and the optical properties of these films can be tuned through changes in the relative content of silica/cellulose nanocrystals. The incorporation of the light-emitting compounds allows a complementary control of the optical properties. The photonic structure plays the role of direction-dependent inner-filter, causing selective suppression of the light emitted with angle-dependent detection.

In the second part of the talk we will present upconversion nanoparticles (UCNPs) containing OIH. These materials are at the core of the widespread applications in solar cells, security inks [2], biosensing [3] and IR-driven photosensitized process like Photodynamic Therapy [4], Photocatalysis [5] and nanothermometry [6].

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References

- [1]-M.V.Santos et al, *Frontiers in Bioengineering and Biotechnology*, 2021, 9, 617328
- [2]-F.Maturi et al, *Adv. Photonics Res.* 2021, 2100227
- [3]-L.R.Lima et al, *Journal of Luminescence* 2016, 170, 375
- [4]-K.Nigoghossian et al, *J. Braz. Chem. Soc.*, 2020, 31(4), 638
- [5]-S.Ullah et al, *Cryst. Eng. Comm*, 2017, 19, 3465
- [6]-K.Nigoghossian et al, *ACS Omega* 2017, 2, 206510