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J-FNH-Jigsaw-like construction of functional NIR-triggered nanohybrids

Lanthanide-doped nanoparticles can absorb NIR photons and emit higher energy photons (UV/Vis/NIR). Functionalization of the NP surface is usually carried out by using flexible ligands which possess group(s) to be anchored to the NP surface and to provide additional functionality to the NP, thus leading to a nanohybrid. It is important to note that there have been reported promising inactivation and viricidal effects of different types of NPs, among them photosensitizer-capped UCNP to inhibit the dengue virus by using NIR light. The search of new strategies of construction NIR-responsive nanohybrids is a relevant matter. We report here on the preparation of NIR-responsive nanohybrids by connecting the key pieces at a fixed position from the UCNP surface by taking advantage of the suitability of symmetric rigid macromolecules to anchor to the NP surface and to a functional group simultaneously. The strategy can be used to fix for e.g. singlet oxygen photosensitizers, fluorophores, and nanoparticles, at a short, specific distance from the UCNP surface; additionally, it enables changing the wavelength of the light stimulus to avoid heating the water in biological samples.¹⁻⁴ This strategy opens up endless possibilities to prepare new nanohybrids intended for specific applications by selecting the key jigsaw pieces.

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Biography

Prof. Dr. Julia Pérez-Prieto is the leader of the Photochemical Reactivity Group at the Institute of Molecular Science of the University of Valencia. She was the President of the European Photochemistry Association from July 2016 to July 2018. She has published more than 175 papers in reputed journals and has been serving as an editorial board member of repute. Prof Pérez-Prieto's research interests are currently focused on the design and synthesis of new photoactive materials, such as organolead halide perovskites, gold nanoparticles and gold nanoclusters, and upconversion nanoparticles to address major challenges in sensing, imaging, therapy, and sustainability.