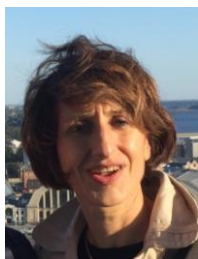


Photoactive organic nanoparticles as tunable actors for theranostics



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Abstract:

The strong development of theranostic nanomaterials, advantageously combining therapeutics and diagnostics, has brought to the forefront fluorescent organic nanoparticles (FONs), made out of self-assembled π -conjugated species. Their “smart” properties actually rely on the high payload of active units, the extensive interactions between the dyes, their ability to self-assemble with hydrophobic drugs, and eventually their large surface-to-volume ratio. There is nowadays no area left unexplored by such functional nanomaterials, amenable to multimodal bioimaging, drug delivery, biochemical sensing, or photodynamic therapy to cite only a few. Whatever the area, the first step relies on the mutual interactions developed between nanoparticles and their surrounding biological media. After a brief survey of the main classes of emissive nanoparticles and their potential pros and cons, we will show through selected examples how photoactive organic nanoparticles have been designed and harnessed to inform on their cellular internalization and fate, and offer dynamic follow-up of drug release as well as selective and minute-like diagnostics.

Biography:

Eléna Ishow entered the Ecole Normale Supérieure de Cachan in 1990 in the Chemistry Department and prepared her Ph.D. in the group of Nanosciences at CEMES laboratory (Toulouse) under the supervision of A. Gourdon onto the elaboration of molecular wires (1997). She worked as a postdoctoral in the group of Prof. V. Balzani in Bologna (Italy) on photoinduced molecular machines fellow (1997-1998). In 1998, she was appointed assistant professor at ENS Cachan (nowadays ENS Paris Saclay) at PPSM laboratory in the group led by Prof. K. Nakatani and spent meanwhile a one-year sabbatical in T. Swager’s lab at MIT (2003-04). She was promoted full professor at Nantes University in 2010, while joining CEISAM laboratory to carry out her research activities.

She has been developing light-responsive molecules and molecular materials (especially photoswitchable) for more than 25 years to address issues for second-harmonic generation and optical data storage, OLEDs, and hybrid magneto-fluorescent nanoassemblies for dual imaging and on-command theranostics. These various research axes have prompted her to initiate and participate in strongly interdisciplinary research programs at the interface of functional organics, materials science, photonics, biology, clinical psychology, and nanomechanics where light-matter interactions remain the common thread to either conceive the targeted systems or unravel collective phenomena.