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Host: Dr. Maurizio Prato

Hybrid nanoparticles protected by fluorinated ligands: features and potentialities

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The introduction of (per)fluoroalkyl ligands on the surface of inorganic nanoparticles (NPs) has attracted the interest of the scientific community since the beginning of this century mainly because of the unique electronic properties of fluorine, the most electronegative element of the Periodic Table. However, the solubility limits of those NPs hampered the full investigation of their properties and their exploitation in relevant applications. The breakthrough was the introduction of amphiphilic fluorinated ligands which enabled us to prepare fluorinated gold nanoparticles well dispersible in aqueous media or in organic solvents for the first time.¹ This paved the way to a variety of other discoveries such as the first example of fluorinated gold NPs as contrast agents for ¹⁹F MRI, exploiting the magnetic properties of fluorine atoms.² Furthermore, these type of NPs demonstrated to be better suited to host hydrophobic compounds³ and to be internalized more efficiently in living cells with respect to the analogous hydrogenated ones. The internalization efficiency is even more enhanced in mixed-monolayers protected gold NPs because the presence of interfacial surfaces between hydrogenated and fluorinated domains in the monolayer favors the positive interactions of fluorinated moieties with cell membranes.⁴

In this lecture I will present our recent advancements on the design of fluorinated NPs for ¹⁹F MRI and basic studies aimed to unravel morphology and packing arrangement of hydrogenated/fluorinated mixed monolayers protected gold NPs.

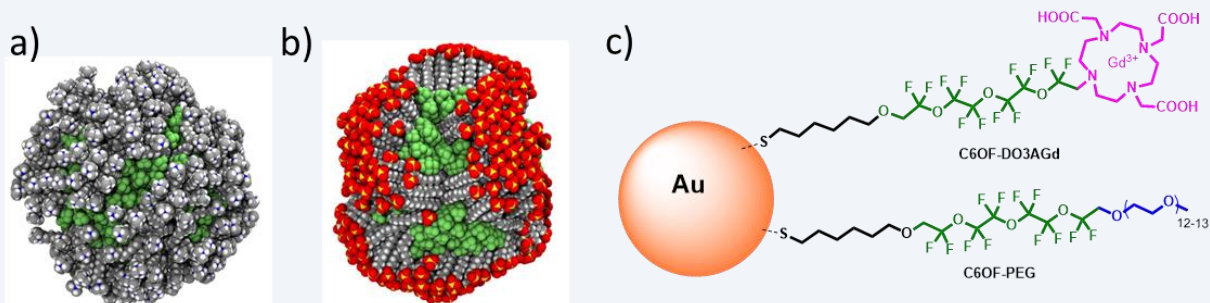


Figure. Example of some fluorinated NPs that will be discussed: space filling model, from MD calculations, of gold NP protected by mixtures of: a) ammonium ion and b) sulfonate ending thiolates and fluorinated ligands and c) fluorinated gold NPs for ¹⁹F MRI.

References

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3. M. Boccalon, S. Bidoggia, F. Romano, L. Gualandi, P. Franchi, M. Lucarini, P. Pengo, L. Pasquato, *J. Mater. Chem. B.* **2015**, 3, 432 – 439.
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