Fluorinated nanoparticles as bioimaging tools and delivery agents

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This work addresses the current need for novel sensitive, robust, and selective diagnostic tools for noninvasive *in vivo* imaging, which are able to improve the medical practice through earlier diagnosis of disease, implementation of targeted therapies, and localization of diseased tissues. Our approach is based on the development of sustainable fluorinated probes enabling ¹⁹F-MRI, as a complementary tool, to be coupled with other diagnostic imaging techniques such as ¹H-MRI, Raman and fluorescence imaging, in order to overcome their present shortcomings. This talk reports about a unique fluorinated imaging agent (PERFECTA) bearing 36 equivalent ¹⁹F atoms and therefore showing a single, intense ¹⁹F-NMR signal. Biocompatible nanoparticles loaded with PERFECTA demonstrated excellent cellular compatibility and spectral properties (relaxation times and sensitivity) adequate for in vivo ¹⁹F-MRI use [1-2]. In this presentation PERFECTA ability to work as multiscale and multimodal probe will be shown [3].



References

- (1) Tirotta I., *et al.* Superfluorinated Molecular Probe for Highly Sensitive in vivo ¹⁹F-MRI. *J. Am. Chem. Soc.* **2014**, 136,24, 8524-27.
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- (3) Chirizzi C., *et al.* A Bioorthogonal Probe for Multiscale Imaging by 19F-MRI and Raman Microscopy: From Whole Body to Single Cells. *J. Am. Chem. Soc.* **2021**, 143, 31, 12253–12260.

Biography



Francesca Baldelli Bombelli is Associate Professor in Chemistry at Politecnico di Milano. She was Group Leader at the European Centre of Nanomedicine (CEN -http://nanomedicen.eu/) in 2013-2015. In 2011-2014 she was Lecturer in Nanotechnology and Colloid Science at the School of Pharmacy, UEA, Norwich, UK. Her research interests are focused on the development of engineered nanomaterials (ENM) for the diagnosis and treatment of untreatable diseases such as cancer and neurodegenerative pathologies. Particularly, she has recently developed fluorinated

nanomaterials (FNM) with exceptional multiscale ¹⁹F-MRI and Raman microscopy imaging properties. She is also interested in studying the effect of fluorination in the promotion of cytosolic delivery of biomolecules and nanoparticles. Moreover, her research also aims at investigating the interactions between ENM and cellular machinery to improve their in vivo efficiency and evaluate possible toxicity effects.