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Fluorescent polymer nanoparticles loaded with a metal organic drug mimic molecule to study the biodistribution *in vivo* of both the carrier and the active principle via a combination of fluorimetry and ICP-MS

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Drug delivery from polymer nanocarriers represents a promising solution in the treatment of many diseases due to the possibility to encapsulate or chemically bound hydrophobic active principles without using any toxic solvent to distribute them intravenously. However, the study of the fate of both the drug and the carrier once they have been injected *in vivo* is still an open issue. In this work, fluorescent poly(ε- caprolactone) based nanoparticles (NPs) have been synthesized and successfully loaded with a titanium organometallic compound as a mimic of a water insoluble drug. The nature of this nanovector enabled us to combine the quantification of the metal in tissues after systemic administration in healthy immunocompetent mice by inductively coupled plasma mass spectroscopy (ICP-MS) to the visualization of NPs in organ sections by confocal microscopy. This innovative method of nanodrug screening has enabled us to carefully elucidate crucial parameters of their kinetics. The organometallic is a good mimic of most anticancer drug and this approach is an interesting starting point to design the relevance of a broad range of nanoformulations in terms of safety and targeted delivery of the cargoes. In particular, the combined analyses we have developed represent an innovative approach to optimize an integrated platform aimed at defining the behaviour of nanodrugs to further study in a broad range of applications. The reliable and robust preliminary results, as reported in this study, is the only way to validate a new formulation based on nanotechnology and to think about a real translation from the bench to the bedside.

Biography

Mattia Sponchioni obtained a BSc in Chemical Enginerring from Politecnico di Milano in 2013, followed by a MSc also from Politecnico di Milano in 2015. He is currently attending the Ph.D. course in Industrial Chemistry and Chemical Engineering working in the Applied Physical Chemistry group under the supervision of Prof. Davide Moscatelli. His research interests span from the synthesis of thermo-responsive polymers as novel smart materials for tissue engineering to the formulation of both polymer and superparamagnetic nanoparticles for imaging.

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