



UNIVERSITÀ
DEGLI STUDI
FIRENZE

UGO SCHIFF
DIPARTIMENTO
DI CHIMICA

Il Dott. **Stefano Fedeli**

University of Massachusetts – Amherst - USA

Venerdì 10 Dicembre alle ore 15:30

in

Aula 186

terrà un seminario
dal titolo:

“Nanomaterial-based bioorthogonal
nanozymes for catalysis in living
systems”

la S. V. è cortesemente invitata

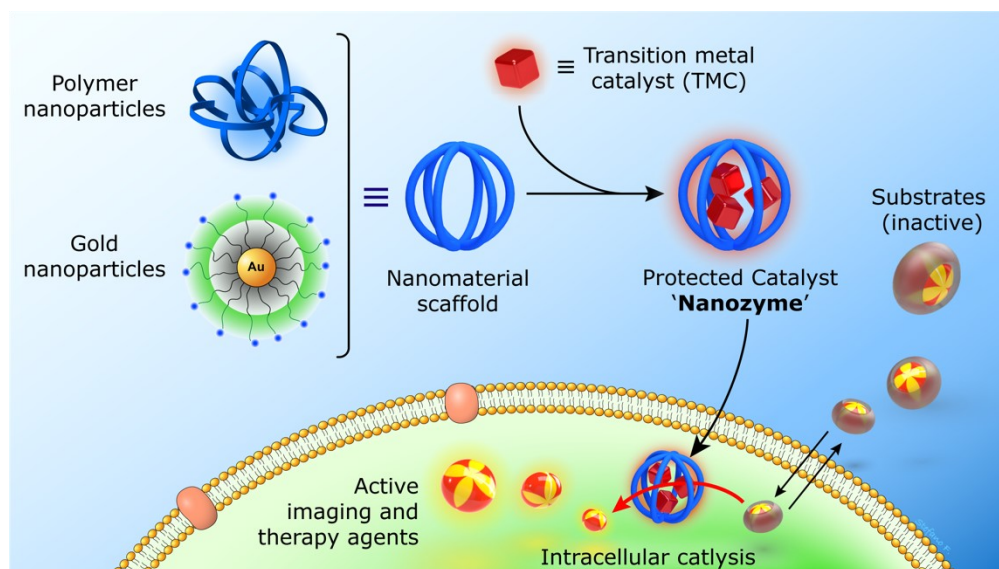
Prof.ssa Barbara Valtancoli

Prof. Stefano Cicchi

Il seminario sarà visibile anche online al link: meet.google.com/qhp-fkij-fwi

Nanomaterial-based bioorthogonal nanozymes for catalysis in living systems

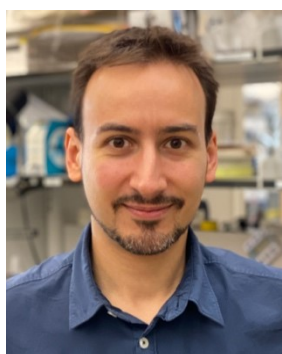
Stefano Fedeli



Bioorthogonal chemistry uses reactions that do not interfere with natural bioprocesses, providing a new approach for imaging and therapeutic strategies. Bioorthogonal catalysis expands this chemistry employing catalytic reactions that natural enzymes cannot access. These reactions enable the creation of bioorthogonal 'factories' in living systems, for localized and controlled generation of drugs and imaging agents directly at the therapeutic site.

Transition metal catalysts (TMCs) are excellent candidates for bioorthogonal catalysis, offering high versatility and reactivity. However, the adoption of free TMCs in living systems faces challenges of solubility, catalyst deactivation and cytotoxicity from the metal. The incorporation of TMCs into nanomaterial scaffolds, as **gold (AuNP)** and **polymer nanoparticles**, provides solubility and stability to the catalysts, enabling their use in aqueous and biological media. Encapsulating the TMCs into these nanomaterials generates bioorthogonal '**nanozymes**' (and '**polyzymes**'), efficient and tunable tools for bioorthogonal catalysis in living systems (schematized in figure).

In our research, we adopt these tools for the treatment of life-threatening biomedical targets as cancer and bacterial infections. Featuring nanomaterials, bioorthogonal catalysis enables dye and drug generation localized at the therapeutic zone, resulting in accurate imaging and effective therapies with minimized side effects.



Stefano Fedeli received his Masters' degree in Chemistry in 2010. He pursued a post-graduation period at the University of Toulouse and two years as research fellow at Politecnico di Milano, working on biocompatible polymers for industrial applications. He received his PhD in chemistry at University of Florence in 2015 working on nanomedicine. Here he obtained a post-doc to continue the studies on drug delivery systems. In 2017 he moved to Colorobbia Research Center to work on nanoparticles for biomedical applications. From 2019 his research is focused on nanomaterials for bioorthogonal catalysis in the Rotello Research Group at University of Massachusetts.



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