

Giovedì 16 Dicembre 2021

alle ore 15.00

presso l'Aula Toraldo di Francia, Edificio F
Area della Ricerca CNR di Firenze
Via Madonna del Piano 10, Sesto Fiorentino

il **Dr. Stefano Fedeli**

University of Massachusetts Amherst
United States of America

terrà il seguente seminario:

"Nanomaterial-based bioorthogonal nanozymes for catalysis in
living systems"

Si invitano tutti gli interessati a partecipare.

Dr. Francesco Vizza
Direttore ICCOM

Short Abstract:

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.

Biographic sketch:

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.