

Università degli Studi di Genova – Istituto Italiano di Tecnologia

**Corso di Dottorato “Scienze e tecnologie della chimica dei Materiali”
Curriculum “Drug discovery and nanobiotechnologies”**

Anno Accademico 2018-2019
Ciclo XXXIV

Research Themes

4(*) positions available with scholarship

Title 1: Exploring nano-bio interactions for the development of new drug delivery systems

This research theme involves the study of uptake, fate, biopersistence/biotransformation mechanisms of nanomaterials in biological systems for applications in nanomedicine, diagnostics, and nanotoxicology. The activities span from synthesis and physico-chemical characterization of nanomaterials to quantitative analysis of nano-bio interactions.

Tutor: Piero Pompa (pierpaolo.pompa@iit.it)

Title 2: Development of colorimetric nanosensors for POC and on-field diagnostics

This research theme will explore the combination of different nanomaterials with advanced biotechnology tools to achieve specific and sensitive assays with minimal instrumental requirements and colorimetric readout.

Tutor: Piero Pompa (pierpaolo.pompa@iit.it)

Title 3: Photochemical Enantioselective Organic Catalysis: Making Biologically Relevant Chiral Molecules with Light(*)

Description of the project: Light-driven processes considerably enrich the modern synthetic repertoire, offering a potent way to build complex organic frameworks. In contrast, it is difficult to develop asymmetric catalytic photoreactions that can create chiral molecules with a well-defined three-dimensional arrangement. By developing innovative methodologies to effectively address this issue, we seek to provide a novel reactivity framework for conceiving photochemical enantioselective organocatalytic processes. We will proceed by translating the effective tools governing the success of ground state asymmetric organocatalysis into the realm of photochemical reactivity.

Preferred skills or background: The successful candidates will have a strong background in organic synthesis and asymmetric catalysis with an interest in medicinal chemistry and photochemistry. Excellent command of written and spoken English is required. Be familiar with common laboratory techniques and synthetic processes as well as with general analytical tools (NMR, GC, HPLC).

Tema 1: Photochemical Enantioselective Organic Catalysis: Making Biologically Relevant Chiral Molecules with Light

Please contact: simone.collobiano@iit.it

(*) informazione aggiornata in data 06/06/2018, a seguito di integrazione, in data 31.5.2018 alla Convenzione sottoscritta con l'università di Genova per l'istituzione dei corsi XXXIV ciclo

Title 4: Light-driven Enantioselective Organic Catalysis(*)

Description of the project: Photochemistry offers fascinating and unconventional ways for making molecules that are often complementary to traditional methods proceeding via thermal pathways. This is because the use of light excitation to bring a molecule to an electronically excited state can unlock unique reaction manifolds that are unavailable to conventional ground-state pathways. However, the involvement of high-energy excited states makes the development of enantioselective catalytic variants of photochemical reactions extremely difficult.

The proposed research seeks to develop novel strategies to control the stereochemical outcome of catalytic photochemical processes by translating the effective tools of organocatalysis into the realm of photochemical reactivity.

Preferred skills or background: The successful candidates will have a strong background in organic chemistry and asymmetric catalysis with an interest in radical reactivity and photochemistry. Excellent command of written and spoken English is required. Be familiar with common laboratory techniques and reaction screening conditions as well as with general analytical tools (NMR, GC, HPLC).

Please contact: simone.collobiano@iit.it

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