

SUSTAINABLE MATERIALS, PROCESSES AND SYSTEMS FOR ENERGY TRANSITION

DM 351PNRR-Luminescent metal complexes for sustainable processes and polymeric photoactive materials

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584] ALMA MATER STUDIORUM UNIVERSITA' DI BOLOGNA [Piva/CF:01131710376]
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Context of the research activity	The research topic of this PhD involves a multidisciplinary approach for pursuing sustainable synthetic processes and new materials with improved photophysical performances. Luminescent metal complexes will be the “core business” compounds and will be designed and used both as components for hybrid polymeric materials, and as photoinitiators for visible light assisted synthesis of new molecules and polymers to be assessed for technologies based on the exploitation of light – matter interaction
Objectives	<p>Scholarship funded in the frame of DM 351 PNRR - CUP: E12B22000770005 Main seat to carry out the research: Department of Industrial Chemistry “Toso Montanari”, University of Bologna (Bologna) Supervisors: Stefano Stagni, stefano.stagni@unibo.it and Loris Giorgini, loris.giorgini@unibo.it</p> <p>The comprehensive investigation of the impact deriving from the use of luminescent metal complexes in visible light activated sustainable synthetic processes and in the design of new photoactive materials, is the scope of the proposed PhD research program.</p> <p>More specifically, the research activity will be accomplished by pursuing two different albeit complementary objectives, which share, as the common feature, the special focus on polymer based substrates and materials. These objectives will consist in: i) the physical and/or chemical combination (i.e. metallopolymers) of different classes of luminescent metal complexes with appropriate polymers aimed at providing new examples of hybrid materials with improved optoelectronic and photovoltaic performances (i.e. Luminescent Solar Concentrators, LSCs) and, ii) the implementation and the optimization of visible light assisted processes - promoted by luminescent metal complexes as photocatalysts or photoinitiators - for the synthesis of both small molecules and, in particular, for polymerization processes such as</p>

ATRP and others. The PhD project will be carried out in a scientific environment that includes robust backgrounds in the synthesis of photo and electroluminescent complexes based on 2nd and 3rd row transition metals, as well as in the design, preparation and characterization of polymeric materials. In addition, the possibility of taking advantage from well-established national (i.e. Professor Andrea Pucci @DCCI, University of Pisa; Dr. Massimo Cocchi @ISOF-CNR) and international (i.e. Professor Max Massi @Curtin University, Perth, Australia) scientific collaborations, will represent an essential and important feature to ensure positive outcomes from this PhD program.

**Skills and
competencies
for the
development of
the activity**

- Excellent background in Chemistry and specific expertise in the synthesis, the structural and the photophysical characterization of transition metal complexes and polymeric compounds.
- Good knowledge of characterization techniques such as: mass spectrometry, NMR spectroscopy, absorption and emission (steady state and time resolved) spectroscopy, GPC chromatography.
- Good attitude for carrying interdisciplinary research involving ongoing and future national and international collaborations.