Seminars at the Department of Chemistry and Industrial Chemistry

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Prof. **Matteo Mauro**

Institut de Physique et Chimie des Matériaux de Strasbourg, Université de Strasbourg & CNRS, Strasbourg, France

mauro@unistra.it
ORCID: 0000-0001-6393-8053
Researcher ID: E-8361-2019

CV:

Education: 2009, PhD in Chemical Sciences, University of Milan (Supervisor: Prof. G. D'Alfonso)

Academic Career:

- ***2018 – to date***: Associate Professor (Maître de conférences-HDR) and Group Leader, Institut de Physique et Chimie des Matériaux de Strasbourg (IPCMS), Université de Strasbourg.
- ***2014***: Habilitation à Diriger des Recherches, Institut de Science et d'Ingénierie Supramoléculaires (I.S.I.S.), Université de Strasbourg.
- ***2012***: Maître de conférences, Institut de Science et d'Ingénierie Supramoléculaires (I.S.I.S.), Université de Strasbourg.
- ***2011 – 2012***: Alexander von Humboldt postdoctoral fellow CeNTech, University of Münster.

Invited Conferences and Seminars: 12 invited conferences (3 PL and 1 KN), 16 invited seminars at universities

Publications: 80 peer-reviewed publications, 6 patents

Awards:

2023 "Raffaello Nasini" Gold Medal, Inorganic Chemistry Division (SCI); **2021 – 2024** Early-Career Advisory Board for the journal *ChemPhotoChem (Wiley);* ***2020,*** Young Chemists for the journal *Chemistry – A European Journal (Wiley);* **2021–2024** Prime d'Encadrement Doctoral et de Recherche (PEDR); **2019**, Young Researcher Prize, Coordination Chemistry Div., Société Chimique France; **2018**, Emerging investigator pour le *Journal of Materials Chemistry B (RSC);* **2010**, ENI Award "Debut in Research"

Venerdì 10 Novembre 2023
Aula 1 - Ore 15:00

Taming Metal Complexes and their excited states for optoelectronics via molecular and supramolecular approaches

Abstract

Luminescent compounds are attracting a great deal of attention also due to their appealing application in real-market technologies, such as electroactive materials in light-emitting devices (*e.g.* OLEDs) as well as photoactive bio-imaging and theragnostic agents, amongst others. In this framework, achieving bright emission in the red and near infrared (NIR) region is intrinsically highly challenging and efficient red/NIR light-emitting devices are still scarce to date, despite their importance in fields such as displays, biomedical devices for phototherapy and telecommunication technology.[1] In the first part of the talk, our most recent results in the field will be presented that are mainly based on dinuclearization strategies to finely modulate both ground and excited states in phosphorescent transition metal complexes.[2] On one hand, selective management of the excited state mixing between singlet and triplet manifolds enabled the preparation of highly emissive red heterobimetallic IrIII/MI complexes. Their successful application as electroluminescent materials in solution-processed light-emitting electrochemical cells (LECs) allowed to achieve external quantum efficiency up to 6%: one of the highest to date for red LECs.[3-4] On the other hand, Cu(I) complexes are an attractive alternative to those based on rarer and more expensive Pt-group metals. To date, Cu(I)-based emitters typically display luminescence from blue to orange, while achieving deep-red to near-infrared (NIR) emission is still very difficult. In this framework, we will present a series of novel bimetallic Cu(I) complexes that display NIR luminescence with maximum emission, lem, max up to 790 nm. In the X-ray structure, the compounds show a doubly locked architecture involving two p-p stacking interactions that helps to mitigate excited-state quenching processes and structural flattening that typically occur in Cu(I) emitters. For the first time, stable Cu(I)-based NIR electroluminescence (EL) is demonstrated with lEL, max up to 756 nm in LECs.[5] Finally, we will turn our attention towards the use of supramolecular weak interactions, such as p-p stacking and metallophilic $d^8\cdots d^8$ interactions, to fine tune and control the emission and aggregation properties of self-assembled Pt(II) complexes in- and out- of their equilibrium.[6]

References:

[1] Y.-D. Lin, C.-W. Lu, H.-C. Su, *Chem. Eur. J.* **2023**, *29*, e202202985.
[2] M. Mauro, *Chem. Commun.*, **2021**, *57*, 5857.
[3] A. Bonfiglio et al., , *Chem. Eur. J.*, **2020**, *26*, 11751.
[4] A. Bonfiglio et al., *Chem. Mater.*, **2022**, 34, 1756.
[5] A. Jouaiti et al., *Angew. Chem. Int. Ed.* **2023**, e202305569.
[6] A. Aliprandi, M. Mauro, L. De Cola, *Nature Chem.* **2016**, *8*, 10.

To find out how to reach the Department, go to **http://www.chimica.unige.it**. For further informations on this specific seminar contact **Prof. Serena De Negri** (e-mail: **serena.denegri@unige.it**)