# CYCLE DE CONFÉRENCES DE CHIMIE

*Avec le concours de : Université Clermont Auvergne*
*INP Clermont Auvergne*

# Jeudi 19 septembre à 16 h

Amphi Rémi (site des Cézeaux)


## Gabriel LOZANO

Instituto de Ciencia de Materiales de Sevilla, Consejo Superior de Investigaciones Científicas-Universidad de Sevilla, Spain


## Nanophosphor photonics for versatile thin emitting layers


Rare earth (RE) emitters, known as phosphors, are central to light-generating applications due to their exceptional thermal and chemical stability. However, this stability comes with an inherent complexity in modifying their emission properties. In this talk, I will show some examples that demonstrate how the integration of phosphors into the engineered optical environments provided by photonic architectures allows fine control over the light emission characteristics without altering their chemical composition or compromising their efficiency. Key to these achievements is the careful analysis of the structural and optical properties of thin films of phosphor nanoparticles with the processing temperature to obtain bright, transparent, and efficient light emitting films suitable for photonic integration. We theoretically and experimentally study the influence of the optical environment on the radiative decay rate of RE transitions in luminescent nanoparticles forming a thin film, and provide a way to rationally tune the spontaneous decay rate and hence the PLQY in an ensemble of luminescent nanoparticles. The combination of nanophosphors and photonic materials opens the door to versatile emitting layers, which is related to our growing interest in the development of light sources with novel functionalities.


References


[1] G. Lozano, J. Phys. Chem. Lett. 9, 3987 (2018).
[2] F. J. Galisteo-López, G. Lozano, J. Appl. Phys. 130, 200901 (2021).
[3] D. Geng, G. Lozano, M. E. Calvo, et al., Adv. Optical Mater. 5, 1700099 (2017) –cover story-.
[4] D. Geng, G. Lozano, H. Míguez, ACS Appl. Mater. Interfaces 11, 4219 (2019).
[5] T. T. Ngo, E. Cabello-Olmo, E. Arroyo, et al., ACS Appl. Mater. Interfaces 13, 30051 (2021).
[6] E. Arroyo, B. Medrán, V. Castaing, et al., J. Mater. Chem. C 9, 4474 (2021) –cover story-.
[7] M. Romero, J. R. Sánchez-Valencia, G. Lozano, H. Míguez, Nanoscale 15, 15279 (2023).
[8] D. Geng, E. Cabello-Olmo, G. Lozano, et al., Mater. Horiz. 5, 661 (2018)–cover story-.
[9] D. Geng, E. Cabello-Olmo, G. Lozano, et al., ACS Photonics 6, 634 (2019).
[10] J. M. Viaña, M. Romero, G. Lozano, et al., ACS Appl Nano Mater 5, 16242 (2022).
[11] E. Cabello-Olmo, G. Lozano, M. Higashino, et al., Chem. Commun. 59, 1289 (2023).
[12] J. Miranda-Muñoz, D. Geng, M. E. Calvo, et al., J. Mater. Chem. C 7, 267 (2019).
[13] E. Cabello-Olmo, P. Molet, A. Mihi, et al., Adv. Optical Mater. 2001611 (2021).
[14] E. Cabello-Olmo, M. Romero, M. Kainz et al., Adv. Functional Mater. 33, 2305907 (2023).



**Coordinateurs** : Alain DEQUIDT ☎ 33 473 407 194 courriel : alain.dequidt@uca.fr
Kévin LEMOINE ☎ 33 473 407 513 courriel : kevin.lemoine@uca.fr
Institut de Chimie de Clermont-Ferrand (ICCF-UMR 6296)
Université Clermont Auvergne, 24, avenue Blaise Pascal, TSA 80026 63178 AUBIERE cedex-France