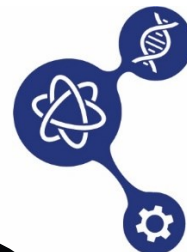


Seminario de Química Física



Miércoles 22 de mayo de 2024 – 11:30 h



Sala de Grados de la Biblioteca

Riccardo Marin

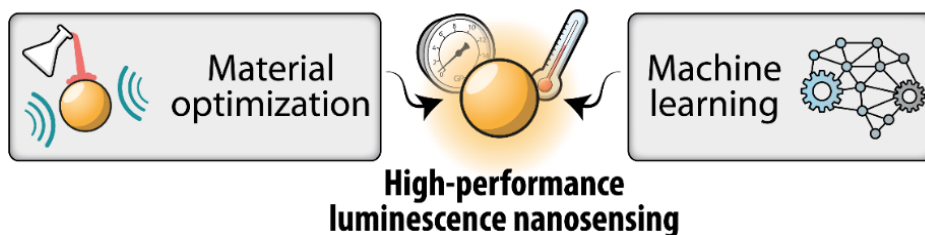
*Nanomaterials for BioImaging Group,
Facultad de Ciencias, UAM*



Luminescence nanothermometry: at the interface between materials science and machine learning

Luminescence nanothermometry is a remote sensing technology whereby a temperature readout is obtained by interpreting changes in the emission of luminescent nanomaterials (i.e., nanothermometers). In *nanoBIG*, our nanothermometers of choice are lanthanide-doped nanoparticles and semiconductor nanocrystals, whose optical properties we tailor for maximum performance in terms of brightness, biocompatibility, and response to temperature. This is what we refer to as *upstream action*. As of late, we have realized the need to introduce a complementary *downstream action*, which entails the use of advanced algorithms to analyze the calibration datasets—i.e., the sets of emission spectra or luminescence decay curves collected while varying the parameter of interest. Via this approach, we were able to overcome longstanding issues that affect luminescence nanothermometry, like reduced readout precision in situations of low signal level and simultaneous sensitivity towards multiple parameters.

In this talk, I will provide a bird-eye view of the recent advancements we were able to achieve in the field of luminescence nanosensing through *upstream* and *downstream* actions. Examples of control of the nanosensor composition, architecture, and surface chemistry will be presented both in the case of lanthanide-doped nanoparticles and semiconductor nanocrystals. On the other hand, I will showcase some of our most recent successes in the implementation of machine learning algorithms to push the boundaries of luminescence nanosensing. Future directions of the research in this complex and rewarding field will be discussed.



- [1] C. D. S. Brites, R. Marin, M. Suta, et al. *Adv. Mater.*, (2023) 35, 2302749.
- [2] I. Zabala-Gutierrez et al. *ACS Appl. Mater. Interfaces*. (2022) 14, 4871–4881.
- [3] E. Ximendes, R. Marin, et al. *Light Sci. Appl.* (2022) 11, 237.
- [4] L. Ming et al. *Adv. Mater.* (2023) 35, 2306606.