

It's Getting Hot in Here: Intracellular Temperature Sensing Through Light Emission

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BACKGROUND

Luís Carlos is Full Professor at the Department of Physics, University of Aveiro and correspondent member of the Lisbon Academy of Sciences (Physics) and Brazilian Academy of Sciences (Chemistry). Since 2009 he has been the vice-director of CICECO - Aveiro Institute of Materials at Aveiro, Portugal. Current scientific interests: luminescence thermometry, emission of lanthanide-based organic-inorganic hybrids, silicates, nanocrystals and metal organic frameworks; applications of organic-inorganic hybrids in solid-state lighting and integrated optics, and nanoparticles as new probes for multimodal imaging.

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ABSTRACT

The emergence of luminescent nanothermometry during the last decade opened up the possibility of measure thermal flows at spatial scales below 10 μm , unreachable by conventional electrical methods.^[1] Diverse phosphors capable of providing a contactless thermal reading through their light emission properties have been examined, e.g., polymers, DNA or protein conjugated systems, organic dyes, quantum dots, and trivalent lanthanide (Ln^{3+}) ions incorporated in organic-inorganic hybrids, multifunctional heater-thermometer nanoplatfoms, upconverting, downconverting and downshifting nanoparticles. The implementation of these Ln^{3+} -based phosphors (with an emphasis in upconverting nanoparticles) as ratiometric thermometers was extensively reviewed in the past five years.^[1]

In the last couple of years, the focus of luminescence thermometry has gradually shifted from the fabrication of more sensitive nanoarchitectures towards the use of the technique as a tool for thermal bioimaging and the unveiling of properties of the thermometers themselves and their local surroundings, as, for instance, the instantaneous ballistic velocity of Brownian nanocrystals suspended in both aqueous and organic solvents.^[2]

After a general perspective of the work done on luminescence nanothermometry since the explosion of the field at one decade ago, the lecture will be focused on a recent example^[3] illustrating the potential of the technology to measure the intracellular temperature.

References:

- ^[1] C. D. S. Brites, S. Balabhadra, L. D. Carlos, *Adv. Opt. Mater.* (2019) 7, 1801239.
- ^[2] C. D. S. Brites, X. Xie, M. L. Debasu, X. Qin, R. Chen, W. Huang, J. Rocha, X. Liu, L. D. Carlos, *Nature Nanotech.* (2016) 11, 851.
- ^[3] R. Piñol, J. Zeler, C. D. S. Brites, Y. Gu, P. Téllez, A. N. Carneiro Neto, T. E. da Silva, R. Moreno-Loshuertos, P. Fernandez-Silva, A. Isabel Gallego, L. Martínez-Lostao, A. Martínez, L. D. Carlos, A. Millán, *Nano Lett.* (2020) 20, 9, 6466.