

NANOTECHNOLOGY SEMINARS

Luminescence (nano)thermometry -and a little bit of manometry-: a pathway to get biomedical insights through remote sensing

Friday, 13th June 2025

12:00 pm

Aula 08 | Piso -1 | ETS de Ingenieros Industriales y de Telecomunicación

ABSTRACT: In the last couple of decades, luminescence thermometry (LT: how the optical emission features of a probe change as a function of its temperature) has experienced an enormous development, provoking widespread interest in particular for biomedical applications. This research area has been consistently delivering ways to monitor temperature changes in a highly varied gamut of systems -even in a quasi-real time manner.

Through this talk, few milestones reached at nanoBIG research unit (Autonomous University of Madrid, UAM) are described, together with the recent expansion of the foundational procedural to manometry, and finally providing a tentative and very preliminary hint into deepening the reach of LT into the "treacherous marshes" of heat transport at nanoscale.

The tone and narrative will be kept self-critical about the sometimes too-trumpeted prospectives of LT and the not-entirely-rigorous adjectivization that its capabilities have raised... notwithstanding the realistic potential of this thermometry approach to address technological and clinical challenges.



THE SPEAKER:

Dr Antonio Benayas is a tenure track-researcher at Universidad Autónoma de Madrid (UAM, Spain), also affiliated to "Ramón y Cajal" Health Research Institute. His research is oriented to near infrared nanoprobes for biomedical applications, luminescence thermometry (recently, also manometry), and plasmonic nanoparticles acting as optically activated heaters. Dr Benayas obtained his PhD in Physics of Light and Matter (UAM) by late 2012 for his work on laser crystalline materials and optical waveguides. He then shifted his research interests to nanoscience, spending four years as postdoctoral fellow at Institut National de la Recherche Scientifique (Montreal, Canada). He then shifted his

research interests to nanoscience, spending four years as postdoctoral fellow at the Institut National de la Recherche Scientifique (Montreal, Canada), where he got funded by the Canadian Institutes of Health Research and Breast Cancer Society of Canada, carrying out different research projects about nanomaterials emitting within near-infrared. In 2017, Dr Benayas was awarded a Global Marie Skłodowska-Curie (MSCA) fellowship, conducting a three-years project on lanthanide-based nanomaterials for imaging and studies on heat conversion efficiency between the Stanford School of Medicine (USA) and the Materials Institute of University of Aveiro (Portugal). By 2020, Dr Benayas was back at his alma mater, supported through the competitive Talent Attraction program of the regional government of Madrid. During the last years, he expanded his research into plasmonic nanoparticles as novel near-infrared triggered actuators.