# Keynote Speakers

## IDENTITY

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## Short Biography

Damien BOYER earned his PhD in "Chemistry of Materials" from Blaise Pascal University, Clermont-Ferrand, in 2000, focusing on the development of sol-gel luminescent materials for optical applications. Following his doctorate, he spent two years as a research associate at the Materials Science Center of the University of Manchester. In 2002, he joined the École Nationale Supérieure de Chimie de Clermont-Ferrand (ENSCCF), now SIGMA Clermont, as an associate professor and obtained his Habilitation in 2009. Over the course of his career, he has supervised or co-supervised 15 PhD theses. His research topics are mainly dedicated to the synthesis of size-controlled inorganic or hybrid phosphors through various materials synthesis processes for optical applications (96 Publications, and 5 patent families). His current research interests include the synthesis of red-emitting phosphors for LED-based lighting, green-emitting phosphors for micoLED displays and infrared-emitting phosphors for biological labelling. he has been leading the Luminescent Materials (LM) group at the Institute of Chemistry of Clermont-Ferrand. The group consists of around 20 members, including 8 permanent researchers

## Title of Oral Presentation

Nanosized inorganic and hybrid phosphors for optical applications

## Keywords (5 words max)

Nanoparticles ; Phosphors ; microLED/LED ; Display ; up-conversion

## Abstract of Oral Presentation

Over the past decade, the demand for nanophosphors has surged, driven by the growing need for advanced materials in a variety of applications. Specifically, nanosized phosphors with superior optical properties have garnered significant attention due to their potential in high-performance displays, fluorescent probes for nanomedicine, and even specialized applications like 3D printing using inkjet technologies. Two main strategies for designing these materials can be considered: bottom-up approaches (constructing them from molecules) and top-down methods (reducing bulk materials to the nanoscale). In this talk, I will explore both strategies for synthesizing various types of nanosized phosphors, including inorganic (oxide and fluoride), organic-inorganic hybrids (organic dyes encapsulated in silica nanoparticles), and semiconductor nanocrystals (Quantum Dots or QDs). I will focus specifically on the preparation of $Y_3Al_5O_{12}:Ce^{3+}$ [1] and $NaYF_4:Yb^{3+},Tm^{3+}$ nanoparticles [2], and discuss their applications: the former as a yellow-emitting phosphor for LED devices based on microLEDs (µLEDs), and the latter as an up-converting phosphor for infrared medical imaging. Additionally, I will present the development of luminescent hybrid nanoparticles, where fluorescein is encapsulated within a silica matrix using the reverse microemulsion method [3]. Lastly, I will discuss a family of cadmium-free quantum dots, consisting of InP cores coated with a ZnS shell. These QDs are particularly promising due to their remarkable size-dependent optical properties, which make them ideal candidates for a variety of applications [4,5].

## Acknowledgement

## References (6 lines max)

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[2] A. Cordonnier et al., Journal of Materials Chemistry B, 9 (2021) 7423-7434. 10.1039/d1tb00777g
[3] R. Boonsin et al., Journal of Materials Chemistry C, 4 (2016) 6562-6569.10.1039/C6TC01039C
[4] R. Valleix et al., Advanced Materials, (2021) 2103411. 10.1002/adma.202103411
[5] R. Valleix et al., ACS Applied Nano Materials, 4 (2021) 11105-11114.10.1021/acsanm.1c02577