JUL.16-18 LC2019
Changchun , CIOMP

Beyond the World's Largest Telescopes: New Technologies and New Opportunities

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There is an increasing need for high power density light sources, e.g. for the next generation of car headlights, diode laser pumped white light sources and projection devices. However, saturation and droop at high excitation densities limit the light output in high power devices. Excited state absorption and long excited state lifetimes play a role, but the relation between light output and excitation power is a poorly understood and is complex interplay of quenching processes including reabsorption and (transient) color center formation. The development of superior materials is crucial and relies on a better understanding of droop processes and the relation with the nature and processing condition of light conversion materials.
In this presentation a basic (and hopefully insightful) overview of known luminescence quenching processes will be followed by a discussion on how we can increase our understanding of luminescence quenching with a focus on high power applications. A variety of quenching mechanisms will be evaluated and illustrated for known and new luminescent materials. New experimental and theoretical capabilities will be discussed that may help to acquire new insights in what limits the light output in current and future light sources.

SHORT BIO:

Andries Meijerink Andries Meijerink received his MSc and PhD degree in Chemistry at Utrecht University. After a post–doc in Madison (University of Wisconsin) he returned to Utrecht in 1991. In 1996, at the age of 32, he was appointed at the chair of Solid State Chemistry in the Debye Institute of Utrecht University where he leads an active group in the field of luminescence spectroscopy of quantum dots and lanthanide ions. In the field of lanthanide ions his work involves fundamental research on the energy level structure of both 4fn and 4fn–15d states and finding new concepts related to applications in solar cells, LEDs and scintillators, including the discovery of downconversion. Andries Meijerink received several awards, including the Shell Incentive Award (1995), the Gold Medal of the Royal Dutch Chemical Society (1999) and the Centennial Award for Luminescence and Display Materials from the Electrochemical Society (2002). In 2009 he was elected into the Royal Dutch Academy of Sciences.

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