NANOMATERIALS SPEAKER SERIES

PHOSPHORS-BY-DESIGN: DEVELOPING THE NEXT GENERATION OF LUMINESCENT MATERIALS FOR SOLID STATE LIGHTING

April 21, 2017 at 12:30pm

CBB, Rm 106

The development of rare-earth substituted phosphors generally relies on the chemical substitution of known compounds or searching phase-space to identify new materials. Yet, this approach often leads to the formation of known structure-types and incremental improvements of current luminescent materials. Transitioning beyond methods of classical materials discovery by turning to high-throughput computation and combinatorial algorithms has shown great promise in the development of new phosphors. A third method uses the combination of DFT-based computation and experiment to predict optical response. For example, calculating the Debye temperature and electronic band-gap of potential host compounds allows the selection of compounds from crystal structure databases ensuring only the best materials are experimentally explored. Our research has followed this approach to target a number of new luminescent materials ranging from borates to nitrides and showed an acceleration in materials discovery. Moreover, the complementary use of computation and synthesis provides an avenue for the fundamental understanding of the composition, structure, and property relationship necessary to advance the development of optical materials.

Jakoah Brgoch

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SPEAKER BIO

Jakoah Brgoch completed his doctoral research in the Department of Chemistry at Iowa State University under the supervision of Gordon Miller in 2012. He then spent 2 years at a post-doctoral researcher in the Solid State Lighting and Energy Center at the University of California, Santa Barbara where he developed a number of novel down-conversion phosphor materials for applications in solid-state lighting devices. He is now an assistant professor in the Department of Chemistry at the University of Houston where his group focuses on developing functional inorganic materials for use as superhard materials, optical reporters in bioanalytical tools, and he continues to work on producing high-efficiency, thermally stable phosphors. All of these projects rely on his group's expertise in machine-learning, theory, and synthetic materials chemistry.

Contact Professor Yan Yao at yya04@uh.edu if you would like to arrange for a time to meet with Dr. Brgoch.

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