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## Data-driven discovery of new phosphors

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Phosphors play a vital role in solid state lighting, advanced displays, anti-counterfeiting, bio-imaging, sensing, and etc. The discovery of new phosphors is usually done by the trial-and error method, but it is a time-consuming and labor intensive. With great advances in lighting and display technologies, phosphors with desired properties are urgently required, new approaches other than the traditional trial-and-error one will be developed or applied to accelerate the searching progress. In this presentation, we will give some examples discovered by high throughput calculations or data-driven method. For instance, an emission wavelength prediction model of  $\text{Eu}^{2+}$  was proposed with the help of high throughput calculations, and several NIR phosphors were found. By understanding the luminescence loss mechanism of phosphors under the high-power laser irradiation, selection rules of laser phosphors were given for searching for red-emitting  $\text{Ce}^{3+}$ -doped laser phosphors. Some new mechnoluminescent phosphors were discovered in compounds with mixed anions, and the distortion index of the coordination polyhedron was used to describe the local symmetry breaking and understand the origin of ML. These results also highlight the importance of building the database of phosphors and clarifying their composition-structure-property relations.

### **Short Bio:**



**Rong-Jun Xie** received his PhD degree in Ceramics from Shanghai Institute of Ceramics, Chinese Academy of Sciences, China. He is a professor of Xiamen University, China. After carrying out post-doctoral work at National Institute for Materials Science (NIMS, Japan), National Institute for Advanced Industrial Science and Technology (AIST, Japan), and Alexander von Humboldt (AvH) research fellow at Darmstadt University of Technology (Germany), Xie joined National Institute for Materials Science (NIMS) as a Senior Researcher in 2003, and was promoted to Principal Researcher in 2007 and to Chief Researcher in 2017. In 2018, he moved to

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Xiamen University as a full professor at College of Materials. Xie's research interests include (i) phosphors for lighting and displays; (ii) mechanoluminescent materials for sensing technologies; and (iii) quantum dots for emissive displays. He has contributed to 300+ published papers with the H factor of 81, delivered 80+ invited talks, and held 50 filed patents. He was awarded Phosphor Award in Japan (2005 and 2008), Tsukuba Encouragement Award (2007), Technical Award of the Electrochemical Society of Japan (2011), The Prizes for Science and Technology by the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology of Japan (2012) and the winner of the 74th CerSJ Awards for Academic Achievements in Ceramic Science and Technology.