



Rong-Jun Xie

Design of luminescent materials for laser-driven solid state lighting

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Laser-driven solid state lighting is now attracting great attention due to its super-high brightness, directionality, compactness and high luminous efficacy, therefore is potentially used in high-beam headlamps of vehicles, sports stadium, airport, cinema projectors, and etc. As the primary blue laser diodes (LDs) have a much higher powder density than blue LEDs, traditional down-conversion luminescent materials used for wLEDs usually show serious luminance saturation under high-power blue LD irradiations. Although the mechanism of luminance saturation is not fully understood, the temperature-induced luminescence quenching is considered as one of major reasons. To reduce the thermal quenching, the luminescence materials used in laser-driven solid state lighting must have the high capability of heat dissipation. The common phosphor-in-silicone cannot be used as it is carbonized under high-power laser irradiation. In this work, we design and investigate three types of luminescent materials for laser lighting: phosphor-in-glass bulks, phosphor ceramics and phosphor-in-glass films. The luminance saturation and optical properties (luminance and luminous efficacy) of these luminescent materials will be presented and discussed. The laser-driven white light will be also demonstrated in the presentation.

SHORT BIO:

Rong-Jun Xie is currently a Professor in College of Materials at Xiamen University. He worked as a post-doc at National Institute for Research in Inorganic Materials (Japan) from 1998–2000, at National Institute of Advanced Science and Technology (Japan) from 2001–2002, and as an Alexander von Humboldt Fellow at Darmstadt University of Technology (Germany) from 2002–2003. He joined National Institute for Materials Science (NIMS, Japan) as a Senior Researcher since 2003 and was promoted to Chief Researcher in 2014. Since 2018, he is a full professor at Xiamen University (China). He was a visiting professor at Eindhoven University of Technology in 2011. He is an Editor for Journal of the American Ceramic Society.