

## A new type of white light-emitting diode light source basing on fluorescent SiC

**Ou, Haiyan; Ou, Yiyu; Lu, Weifang; Fadil, Ahmed; Argyraki, Aikaterini; Kaiser, Michl; Wellmann, Peter; Jokubavicius, Valdas; Syväjärvi, Mikael**

*Publication date:*  
2015

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Ou, H., Ou, Y., Lu, W., Fadil, A., Argyraki, A., Kaiser, M., ... Syväjärvi, M. (2015). A new type of white light-emitting diode light source basing on fluorescent SiC. Abstract from SSLCHINA 2015, Shenzhen, China.

## DTU Library

Technical Information Center of Denmark

---

### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

## **A new type of white light-emitting diode light source basing on fluorescent SiC**

Haiyan Ou<sup>1,\*</sup>, Yiyu Ou<sup>1,2</sup>, Weifang Lu<sup>1</sup>, Ahmed Fadil<sup>1</sup>, Aikaterini Argyraki<sup>1</sup>, Michl Kaiser<sup>3</sup>, Peter Wellmann<sup>3</sup>, Valdas Jokubavicius<sup>4</sup>, Mikael Syväjärvi<sup>4</sup>

Department of Photonics Engineering, Technical University of Denmark, DK-2800, Lyngby, Denmark

2 Presently with Light extraction ApS, DK-2800, Denmark

3Materials of Electronics Energy Technology, University of Erlangen-Nuremberg, D-91058, Erlangen, Germany

4 Department of Physics, Chemistry and Biology, Linköping University, SE-58183, Linköping, Sweden

\*haou@fotonik.dtu.dk

### **Abstract**

Most of the commercial white light-emitting diode (LED) light sources are made from phosphor coated blue-emitting gallium nitride (GaN) chips. This type white LED light source always has tradeoff between luminous efficacy and color rendering index (CRI). Furthermore, yellow-emitting phosphor decays much faster than the semiconductor chip, so the white color will turn into bluish over the time. This paper will propose a new type white LED light source: using fluorescent silicon carbide (SiC) to take the place of phosphor. This new type LED has the following advantages: a) SiC is a wide bandgap semiconductor material, so it is stable; b) Fluorescent SiC has very wide emission spectrum, and it could generate white light with very high CRI; c) It is a better substrate than sapphire for the GaN growth in terms of lattice match and thermal conductivity. This paper will cover: the growth of fluorescent SiC, its optical characterization, nanostructuring of the SiC surface for extraction efficiency enhancement, and surface passivation for further efficiency enhancement.