

# Winter 2018 Colloquium

## NAKAMURA LECTURE

### Materials Department

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Director

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Center

National Institute of Information and  
Communications Technology

Friday, February 9th, 2018

11:00 am, ESB 1001



#### **Gallium Oxide Electronics: Challenges and Opportunities**

Gallium oxide ( $\text{Ga}_2\text{O}_3$ ) has excellent material properties especially for power device applications that are represented by the extremely large breakdown field more than 5 MV/cm due to its large band gap of 4.5 eV. It is also attractive from an industrial viewpoint since large-size, high-quality wafers can be manufactured from a single-crystal bulk synthesized by melt-growth methods. These two features have drawn much attention to  $\text{Ga}_2\text{O}_3$  as a new ultrawide bandgap semiconductor following SiC and GaN.

In this lecture, after a short introduction of material properties and features of  $\text{Ga}_2\text{O}_3$ , I will talk about our state-of-the-art  $\text{Ga}_2\text{O}_3$  device technologies of metal-oxide-semiconductor field-effect transistors and Schottky barrier diodes.

#### **Bio**

Masataka Higashiwaki received the B.S., M.S., and Ph.D. degrees all in solid-state physics from Osaka University, Japan, in 1994, 1996, and 1998, respectively. After a two-year postdoctoral fellow, in 2000, he joined the Communications Research Laboratory (CRL), Japan, as a Researcher, where he was engaged in research and development on MBE growth and device processing of group-III nitride-based transistors. From 2007 to 2010, he took a temporary leave from the National Institute of Information and Communications Technology (NICT), which was renamed from CRL in 2004, and joined the Department of Electrical and Computer Engineering, University of California, Santa Barbara as a Project Scientist. He returned to NICT in 2010 and started a pioneering work on  $\text{Ga}_2\text{O}_3$ -based electronics. He is now a Director at Green ICT Device Advanced Development Center.

Dr. Higashiwaki was a recipient of several awards for his work on GaN and  $\text{Ga}_2\text{O}_3$ -based electronic devices, including the 2014 Japan Society for the Promotion of Science (JSPS) Prize, the 2007 International Symposium on Compound Semiconductors (ISCS) Young Scientist Award, and the 2006 Japan Society of Applied Physics (JSAP) Outstanding Achievement Award for the Best Original Paper. He has authored and co-authored over 200 papers in technical journals and international conferences.

<http://www2.nict.go.jp/green/>

Hosted by Jim Speck and Steve DenBaars.