

“Development of High Efficiency Blue InGaN LEDs and Laser Diodes”

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Abstract

The development of high brightness blue LEDs and blue laser diodes required many breakthroughs of III-Nitride growth, p-type conductivity control and device structures using InGaN/GaN double heterostructures. First, the speaker will discuss the history and background story of the key scientific issues solved in order to realize high efficiency solid state lighting. The fundamental discovery of high quality p-type doping by removing hydrogen passivation, and the role of the InGaN/GaN double heterostructure in achieving high brightness blue LEDs and Laser Diodes will be described. Next the speaker will talk about the future laser lighting at the University of California at Santa Barbara. In particular, solving both current “droop” and thermal “droop” has been identified as key roadblocks to cost reduction and further improvements in solid state Lighting.

Biography

Dr. Shuji Nakamura obtained B.E., M.S., and Ph.D. degrees in Electrical Engineering from the University of Tokushima. Professor Nakamura is widely recognized for developing the first III-nitride-based blue/green LEDs and III-nitride-based violet laser diodes. Dr. Nakamura joined the University of California, Santa Barbara in 1999. He is currently the Research Director of the Solid State Lighting & Energy Electronics Center and The Cree Professor in Solid State Lighting and Display. His research includes MOCVD growth and device fabrication of indium gallium nitride (InGaN) light-emitters. He received the 2006 Millennium Technology Prize for his invention of revolutionary new energy-saving light sources and the 2014 Nobel Laureate in Physics for the invention of efficient blue LEDs, which have enabled bright and energy-saving white light sources.