SAND2014-19034PE

Exceptional service in the national interest

Sandia National Laboratories

EERE SSL Product Roundtable: Smart, Efficient, Microsystem-Enabled SSL

Jeff Tsao, Jon Wierer, Bill Sweatt

Sandia National Laboratories

October 8, 2014

Work at Sandia National Laboratories was supported by Sandia's Solid-State-Lighting Science Energy Frontier Research Center, funded by the U.S. Department of Energy, Office of Basic Energy Sciences. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

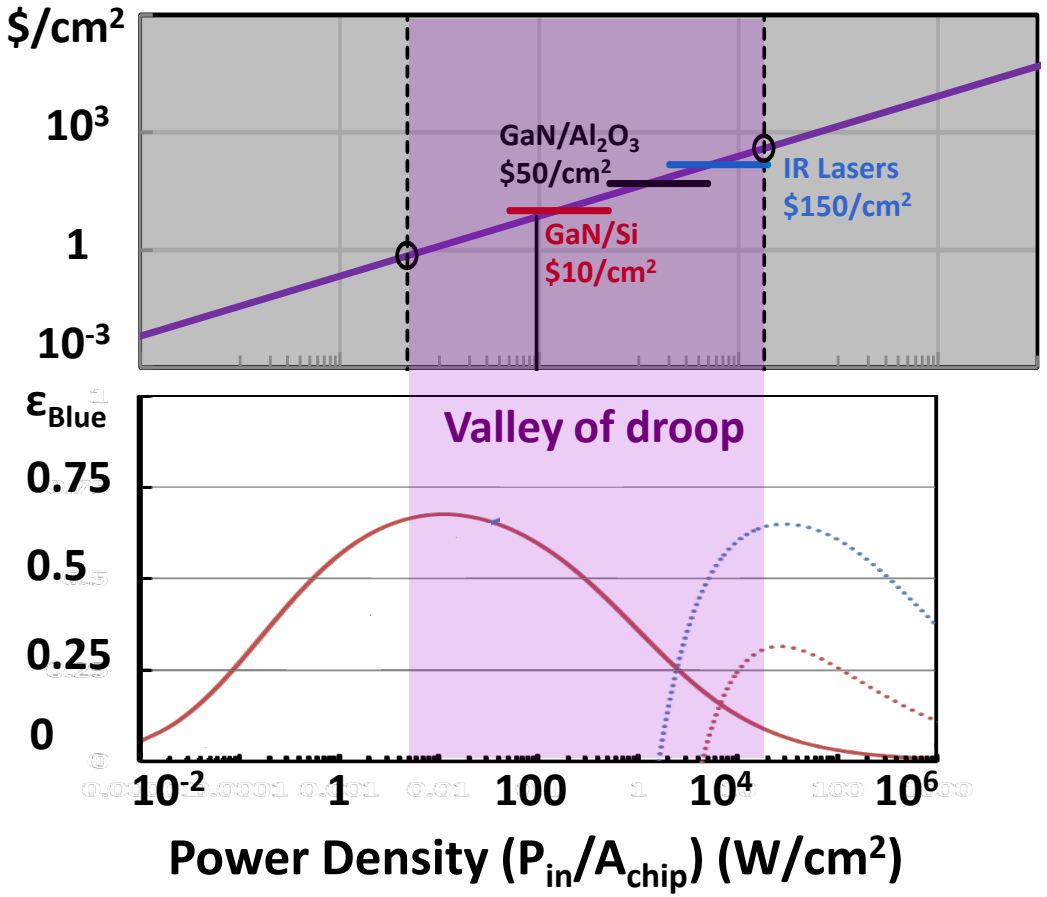
Lasers for SSL

The Economics Case

Chip areal cost necessary for $CoL_{cap} < CoL_{ope}/6$

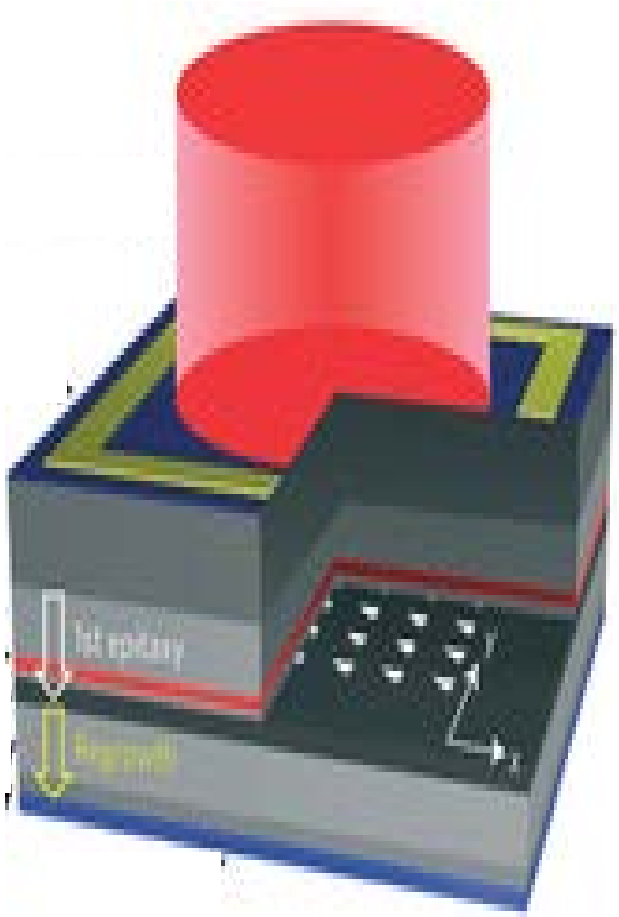
The Physics Case

Filling the efficiency "valley of droop" at intermediate power densities



J.J. Wierer, J.Y. Tsao, D.S. Sizov, "Comparison between blue lasers and light-emitting diodes for future solid-state lighting," Laser & Photonics Reviews 7, 963–993 (2013).

Even Better and on the Horizon: Photonic Crystal Surface Emitting Lasers



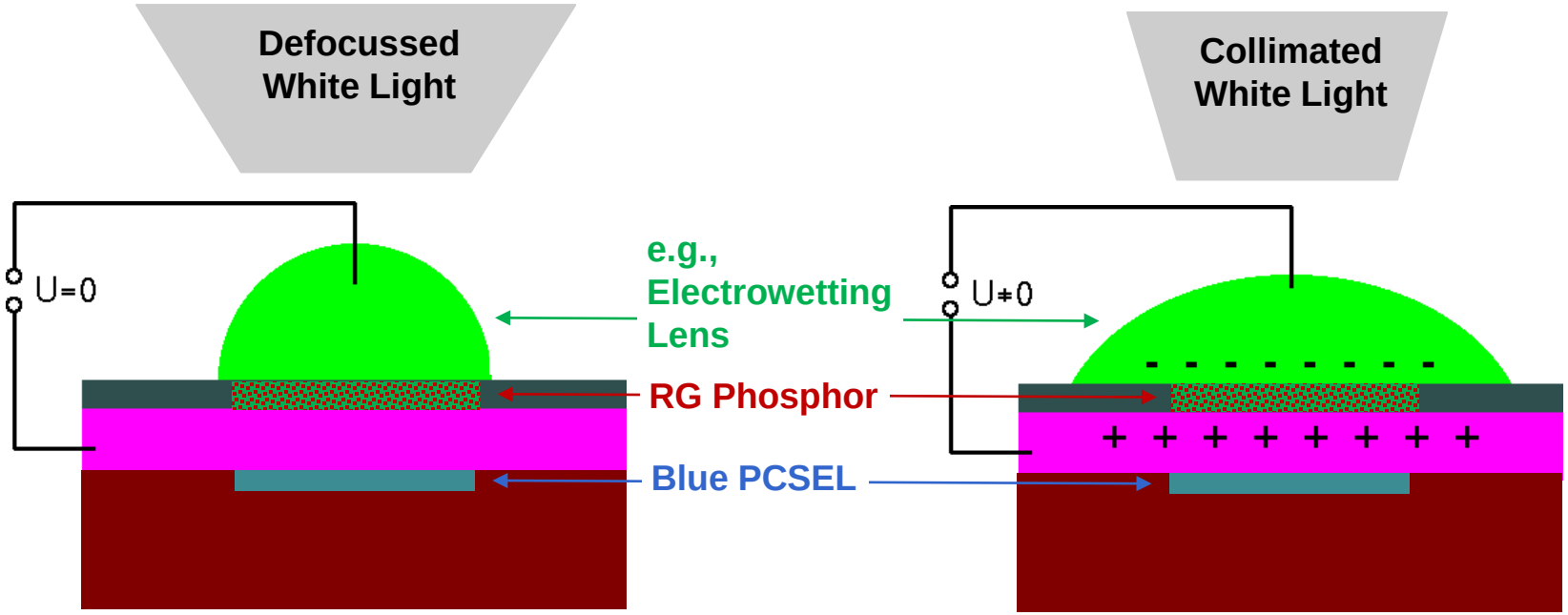
InGaAs IR Quantum Well PCSEL
(Kyoto University breakthrough)

ARTICLES
PUBLISHED ONLINE: 13 APRIL 2014 | DOI: 10.1038/NPHOTON.2014.75
nature photonics

Watt-class high-power, high-beam-quality photonic-crystal lasers

Kazuyoshi Hirose[1,2†*], Yong Liang[2†], Yoshitaka Kurosaka[1,2], Akiyoshi Watanabe[1], Takahiro Sugiyama[1] and Susumu Noda[2,3*]

Better Still: PCSEL-Based Microsystem-Enabled SSL



Theater Lighting goes Viral