PROCEEDINGS OF SPIE

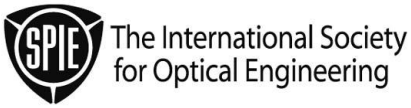
Gallium Nitride Materials and Devices II

Hadis Morkoç
Cole W. Litton
Chairs/Editors

22–25 January 2007
San Jose, California, USA

Sponsored and Published by
SPIE—The International Society for Optical Engineering

Volume 6473



Proceedings of SPIE—The International Society for Optical Engineering, 9780819465863, v. 6473

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Please use the following format to cite material from this book:
Author(s), "Title of Paper," in *Gallium Nitride Materials and Devices II*, edited by Hadis Morkoç, Cole W. Litton, Proceedings of SPIE Vol. 6473 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 0277-786X
ISBN 9780819465863

Published by
SPIE—The International Society for Optical Engineering
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone 1 360/676-3290 (Pacific Time) · Fax 1 360/647-1445
http://www.spie.org

Printed in the United States of America.

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Introduction

The conference on Gallium Nitride Materials and Devices, christened last year as a tribute to cap the long and productive career of Dr. G. L. Witt, continued very successfully in 2007.

As mentioned in the introduction for the 2006 GaN Materials and Devices proceedings, attainment of p-type GaN in the late 1980s broke open the logjam that had prevented researchers from demonstrating the many attractive attributes of GaN for decades. In fewer than a couple of decades since then, even with materials nowhere near the perfection that would be required for other materials, both optical and electronic devices with record-breaking or previously unavailable performance/property have been obtained. Today, the GaN-based light emitters adorn automobiles, traffic lights, moving signs, outdoor displays, handheld electronics, and background lighting in many consumer electronics, including flat-panel televisions. Soon, the more extensive applications of GaN light emitters in televisions will be seen in the marketplace. All-LED outdoor white lighting applications are already in full swing, with high-brightness large-area wafer-bonded LEDs producing optical power levels in excess of 200 mW. High-end LEDs exhibit efficacies well above 100 l/W and are being achieved by increasing numbers of LED manufacturers. Indoor general lighting applications are very near with acceptable color rendering index, not to mention the color temperature.

It is really an exciting time for GaN-based LEDs, in that applications to general illumination seem to be around the corner with tremendous advances in light extraction methods with efficiencies approaching 80%, which is remarkable. GaN-based LEDs truly represent the hottest device today, and will soon save many terawatts of power per year from being wasted. This could not come at a better time, when greenhouse emission gasses and the carbon footprint that we leave on Earth are increasingly becoming front page news in newspapers and other mass communication media across the globe. GaN-based lasers also are making their presence known with the introduction of PlayStation III by Sony late in 2006. UV detectors, particularly those in the solar blind region of the spectrum, with performance comparable to venerable photomultiplier tubes but at a fraction of the size and power requirement, have been accomplished. In the radio frequency power arena, one GaN chip is now able to produce CW power levels above 400 W at 2GHz and some 10 W in the millimeter-wave region for applications in the wireless and agile radar.

The SPIE conference on GaN Materials and Devices served to disseminate the latest results and provide an opportunity for researchers from around the world to engage in discussions to advance this exciting field even further. Many world-renowned invited speakers from Asia, Europe, and the USA set the stage with

discussions related to extended and point defects; characterization of GaN and related materials and efforts/methods to reduce defects; fundamental processes that are taking place in GaN in the context of defects, carrier and phonon dynamics, and their influence on transport and noise; very high-power FETs with hundreds of watts of power from single chips, for example base station power levels of 370 W and pulsed power of 750 W (this power levels changes upward daily); much improved lasers with over 10,000 hr projected operating lifetimes at 50 mW power, UV lasers and emission modes; detectors; and finally not just bright but HOT LEDs which continue to take the world by storm not only for displays and background lighting endemic in many consumer electronics, but also outdoor lighting, while inching ever closer to indoor illumination (dubbed with a misnomer of solid state lighting). Very high-quality contributed papers augmented and enhanced the truly exceptional image set forth by the invited speakers. Most importantly, the meeting served the purpose of getting experts in the field together for friendship and informal discussions of issues relevant to GaN and related materials and devices.

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Cole W. Litton