Special Issue

Journal of Photonics for Energy

Organic Light-Emitting Materials and Devices XIV

Editors
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1–4 August, 2010
San Diego, California, USA

SPIE Proceedings Volume 7776

SPIE

The papers included in this volume were presented at the technical conference cited on the cover and title page. Papers were peer reviewed and published as a special section of the *Journal of Photonics for Energy*. These journal articles reflect the work and thoughts of the authors. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

ISSN: 1947-7988 (Journal of Photonics for Energy)
0277-786X (Proceedings of SPIE)

ISBN: 9780819482730

Published by
SPIE—The International Society for Optical Engineering
P.O. Box 10, Bellingham, Washington 98227-0010 USA
http://www.spie.org

Printed in the United States of America.

Vol. 1
2011

Journal of
Photonics for Energy

Article Numbers: Each paper is designated by a unique six-digit article number. Use of article numbers in place of traditional page numbers allows articles to be fully citable as soon as they are published online. References to papers in this special section should be cited using the format shown in the following example:

J.-H. Jou et al., "Sunlight-style organic light-emitting diodes," *J. Photon. Energy* **1**, 011021 (2011).

Special Section on Organic Light-Emitting Materials and Devices

Journal of Photonics for Energy

Guest Editorial: Organic Light-Emitting Materials and Devices

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Organic light-emitting diodes (OLEDs), invented by Ching Wang Tang in 1987, were a scientific curiosity initially until Richard Friend's discovery of electroluminescence from polymers. Since then, a lot of active research activities have been undertaken to develop highly luminescent and charge-carrier-transporting organic materials, as well as efficient and stable OLEDs. In the last decade, progress has been made in this active area of research, and many companies like Samsung, Sony, and others began to commercialize OLEDs for flat-panel display applications. Compared to liquid crystal displays (LCDs), OLEDs offer many advantages, such as higher contrast ratio, higher response speed for video, and lower power consumption. Today, next-generation display technology based on OLEDs is a new enabling technology that promises to eventually replace LCD-based displays. Another promising application is in the area of solid-state lighting. In order to achieve this new goal, the performance of OLEDs needs to go to the next level, with higher efficiency and longer lifetime. Further development in high-performance materials such as efficient phosphorescent emitters, stable and high-bandgap host materials, and efficient carrier-transport materials are critical to the development of OLEDs with enhanced efficiency and long-term stability. In addition, further understanding of loss and device degradation mechanism(s) is also very important. In OLEDs, almost 75% of the photons generated are lost, and novel approaches to enhance light extraction are vital for solid-state lighting applications.

Papers that address the above issues and challenges are presented in this special section, which is based on presentations given at the 2010 conference on Organic Light-Emitting Materials and Devices at the SPIE Optics and Photonics meeting held in San Diego. We believe that readers will find the results of the studies discussed in these manuscripts informative, interesting, and in some cases unexpected or surprising. We hope that you will enjoy reading these papers.

1947-7988/2011/$25.00