PROCEEDINGS OF SPIE

Laser-based Micro- and Nanopackaging and Assembly VII

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Editors

6–7 February 2013
San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 8608

Proceedings of SPIE 0277-786X, V.8608

Laser-based Micro- and Nanopackaging and Assembly VII, edited by
Udo Klotzbach, Yongfeng Lu, Kunihiko Washio, Proc. of SPIE Vol. 8608, 860801
© 2013 SPIE · CCC code: 0277-786X/13/$18 · doi: 10.1117/12.2025067

The papers included in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. The papers published in these proceedings reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from this book:
Author(s), "Title of Paper," in *Laser-based Micro- and Nanopackaging and Assembly VII*, edited by Udo Klotzbach, Yongfeng Lu, Kunihiko Washio, Proceedings of SPIE Vol. 8608 (SPIE, Bellingham, WA, 2013) Article CID Number.

ISSN: 0277-786X
ISBN: 9780819493774

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPIE.org

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

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Introduction

The "Laser-Based Micro Packaging" conference series was established in 2002. In 2007, the conference was renamed as "Laser-Based Micro- and Nanopackaging and Assembly (LBMP)" to reflect the topics associated with structures at Nanoscales. The LBMP conference brings together researchers and engineers from scientific and academic institutions and industry in order to provide a platform for mutual and fruitful discussion on application-oriented, cutting-edge research fields. The scope of relevant applications covers the fabrication of electronic, photonic, mechanical, chemical, bio-active, and bio-compatible devices. Because of the strong economic demands, laser materials processing is playing an increasingly important role in areas covered by the LBMP conference, along with new "green technologies" such as photovoltaics and advanced energy storage systems.

Advanced laser-based processes for micro- and nanopackaging and assembly are strongly demanded by high-tech industries for specialized prototypes and high throughput devices with micro- and nanostructures to realize electronic, photonics, mechanical, fluidic, chemical, and biological functionalities. However, the realization of such devices or functional prototypes imposes new challenges for patterning, packaging, and assembly.

Due to the continuous increase in complexity of device structures, processing needs for wide varieties of materials are leading to new applications and research fields but at the same time imposing new challenges for appropriate assembly and packaging technologies. The laser-induced modification of material properties at micro- or nanoscales becomes more and more important in some applications (e. g. photovoltaics) where undesired material and surface modification such as chemical or heat-affected structural change must be avoided. Meanwhile, an increase in production costs or significant changes of established production lines can be limiting factors. Therefore, both high-performance new products and innovations for high efficiency/high-throughput manufacturing and assembly technologies are the focus of the conference.

The conference LBMP VII was held 6–7 of February, as a part of LASE 2013 at Photonics West in San Francisco, California. LBMP-VII comprised 28 presentations which were presented by speakers from Australia, Denmark, France, Germany, Italy, Japan, Switzerland, United Kingdom, and United States. Presentations represented a number of topics including: laser micro- and nanostructuring, ultrashort pulsed laser processing, direct-write processing and surface-modification, packaging and additive manufacturing, photovoltaics, alternative energy sources and advanced energy storage systems. A joint session was organized with Conference "Laser Applications in Microelectronic and Optoelectronic Manufacturing XVIII (LAMOM XVIII) on photovoltaics, alternative energy sources and advanced energy storage systems.

Laser-based micro- and Nano-applications were highlighted in two sessions with micro- and nanostructuring talks. Both sessions included topics very interesting for many scientific communities at universities and research institutes. At the same time, many industrial applications have a background of micro- and nanostructuring. Some speakers presented results on laser ablation of different materials using pico- and nanosecond lasers. Because of the reduced heat affect zone with short pulsed and ultra-short pulsed lasers, high-quality material processing of polymer materials and thin film ablation are possible. The talks about laser material processing of display glasses, flexible displays and transparent materials with short pulsed lasers showed new aspects for laser material processing.

The special field of laser direct writing and surface modification together with additive manufacturing with several laser types showed very interesting applications laser sintering and crystallization for high-performance electronics. In future microelectronics, the topic of "printing a chip" will be more popular, represented by the talk "laser assisted ultrathin bare die packaging: a new route to a new class of microelectronic devices."

Ultrashort pulsed lasers have shown their usefulness in various areas for many years. During the recent years—especially in the photovoltaic industry—ultrashort pulsed lasers have demonstrated and evidenced the wide range of applications in industrial environments. The joint session showed new aspects and applications with lasers in the field of photovoltaics.

We would like to express our deepest gratitude to the program committee members and the SPIE technical staff for their great efforts during the planning and organization of LBMP-VII. We would also like to thank the invited speakers and presenters of the contributed papers for their contribution to the success of this conference. All the manuscripts were peer reviewed to ensure the quality of the conference proceedings.

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Kunihiko Washio