

Introduction to the Issue on Optical Microsystems

THE field of optical microelectromechanical systems (MEMS) and optical microsystems is at a very exciting and dynamic state of development. A foundation of fabrication processes has been established over the last several years, fueled by the investments in MEMS for telecommunication applications. Much of the research in the field is still focused on creation of advanced fabrication, integration, and packaging technologies, but optical MEMS has also become an enabling technology for a variety of applications. This has led to an increasing system emphasis in optical MEMS research, to the point where we have chosen to use the name Optical Microsystems for this issue of the IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS to highlight the increased concentration on integrated devices and systems. In parallel with the technological maturation and increased systems emphasis that we are now experiencing, there are also exciting new concepts, techniques, and applications being introduced. Particularly noteworthy are the use of MEMS actuators to create tunable photonic crystals and the application of optical MEMS to microscopy and imaging.

The state of development of optical MEMS is reflected in the distribution of papers in this issue. Broadly speaking, the papers can be placed in the following three categories:

- 1) technology development with emphasis on actuator design, integration, and low-cost fabrication;
- 2) novel optical systems enabled by optical MEMS technology;
- 3) devices that incorporate optical MEMS in novel architectures with novel functionality.

This diversity demonstrates that although optical MEMS is maturing, it is still a very dynamic and exciting field, which we think is well represented by the excellent collection of papers in this issue of the IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS.

We wish to extend our thanks to the authors who contributed to this issue, to the IEEE Lasers and Electro-Optics Society staff who have devoted so much of their time to the publication of this issue, and to you, the reader, for your interest in this topic. We think you will find the papers interesting, stimulating, and entertaining, and we hope to see you at the next IEEE International Conference on Optical MEMS in Takamatsu, Kagawa, Japan, from August 22–26, 2004.

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From 1992 to 1995, he carried out research in optical MEMS as a Postdoctoral Fellow at the University of California, Berkeley, and in 1995, he joined the Electrical Engineering Faculty of the University of California, Davis. Since 1999, he has been with Stanford University, where he is now an Associate Professor of electrical engineering. His research interests include fabrication technology for microoptical devices and systems, optical communication and sensing, and nanophotonics. He has authored more than 100 technical publications, holds 15 patents, and is

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Professor Solgaard went to Stanford University with the support of a Royal Norwegian Council for Scientific and Industrial Research Fellowship in 1986 and, as a Faculty Member, was named a Terman Fellow at Stanford for the period 1999–2002.



Joseph Talghader received the B.S. degree in electrical engineering from Rice University, Houston, TX, in 1988, and the M.S. and Ph.D. degrees from the University of California at Berkeley, in 1993 and 1995, respectively. During his graduate studies, he focused on semiconductor lasers and microfabrication techniques and developed assembly techniques for vertical-cavity surface-emitting lasers.

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Harri Kopola received the Dipl.Eng., Licentiate of Technology, and Doctor of Technology degrees in electrical engineering from the University of Oulu, Oulu, Finland.

In 1989, he became a Postdoctoral Fellow with the University of Ottawa, Ottawa, ON, Canada. Since 1990, he has been Acting Chief Assistant, Associate Professor (1992–1994), and Professor in electronics (1994–1995) at the Electronics Laboratory, University of Oulu. In 1995, he became a Research Professor in optoelectronics at VTT Electronics, Oulu, where, from 1998 to 2002, he was also the Head of Optoelectronics Research. Since April 2002, he has been the Research Director at VTT Electronics. His research interests include the areas of miniaturization of optoelectronic modules, sensors and instruments, and printable optoelectronics.