



IEEE PHOTONICS TECHNOLOGY LETTERS is published by the IEEE Lasers and Electro-Optics Society. All members of the IEEE are eligible for membership in the Society and will receive the LETTERS upon payment of the annual Society membership fee of \$18.00, plus an annual subscription fee of \$25.00. For information on joining, write to the IEEE at the address below. Member copies of Transactions/Journals are for personal use only.

## IEEE LASERS AND ELECTRO-OPTICS SOCIETY

## Board of Governors

2002–2004		2003–2005		2004–2006
C. HARDER	B. Y. KIM	R. BAETS	M. Y. L. WISNIEWSKI	A. C. BRYCE
P. IANNONE	K. STUBKJAER	N. DAGLI	Y. YOSHIKUNI	W. SORIN
				R. W. TKACH

## Officers

H. S. HINTON, *President* A. E. WILLNER, *President-Elect* S. NEWTON, *Secretary-Treasurer*  
G. D. KHOE, *Junior Past President* M. CHANG, *Senior Past President*

**Executive Office**—P. W. SHUMATE, *Executive Director*

## Committees

**Publications** (Continued)

L. ESTEROWITZ, *IEEE Journal of Quantum Electronics Editor*  
P. J. DELFYETT, *IEEE Journal of Selected Topics in Quantum Electronics Editor*  
M. WISNIEWSKI, *LEOS Newsletter*  
H. S. HINTON, *LEOS Portal Editor*  
G. K. CHANG, C. MADSEN, *Journal of Lightwave Technology (JLT) Steering Committee*

**Vice President (Conferences)**—N. BERGANO

P. J. ANTHONY, K. D. CHOQUETTE, C. R. GIULIANO, S. NEWTON, *CLEO Steering Committee*  
W. T. ANDERSON, N. BERGANO, S. K. KOROTKY, B. NYMAN, *OFC Steering Committee*  
C. HARDER, *CLEO/Europe Steering Committee*  
T. A. NIRMALATHAS, Y. YOSHIKUNI, *CLEO/Pacific Rim Steering Committee*

**Vice President (Membership & Regional Activities)**

—Americas—N. RIZA

**Vice President (Membership & Regional Activities)**

—Asia & Pacific—K. OKAMOTO

**Vice President (Membership & Regional Activities)**

—Europe, Mid-East, & Africa—S. DONATI

**Vice President (Finance & Administration)**—J. MARSH

J. G. EDEN, *Awards & Lecturers Committee*  
G. D. KHOE, *Constitution & Bylaws*  
G. W. DAY, *LEOS Fellows Committee*  
J. MARSH, *Finance Committee*  
J. FOUQUET, *IEEE Technology Policy Council Chair*  
E. D. HINKLEY, M. M. SOKOLOSKI, *Committee on Transportation & Aerospace Technology Policy*  
M. A. DUGUAY, *Energy Policy*  
A. YANG, *Committee on Communications & Information Policy*  
A. GUENTHER, *R&D Policy*

**Vice President (Technical Affairs)**—I. C. KHOE

B. HITZ, *Standards Committee Chair*

**Representatives to Technical Councils & Committees**

C. CLAYTON, J. J. COLEMAN, *Joint Council on Quantum Electronics*  
A. M. WEINER, A. WILLNER, *USAC—International Commission on Optics*  
R. O. CLAUS, *Sensors Council*

**Technical Committees**

B. CHALAMALA, *Displays*  
B. JAVIDI, *Electro-Optical Sensors & Systems*  
T. R. RANGANATH, *Integrated Optics & Optoelectronics*  
I. GANNOT, *Lasers in Medicine & Biology*  
P. JUODAWLKIS, *Microwave Photonics*  
R. BATES, J. WOLTER, *Nanotechnology*  
T. GAVRIELIDES, *Nonlinear Optics*  
S. WOODWARD, *Optical Communications*  
C. MADSEN, *Optical Fiber & Planar Waveguide Technology*  
G. K. CHANG, *Optical Networks and Systems*  
H. THIENPONT, *Optical Interconnects & Processing Switching*  
D. HUFFAKER, *Optoelectronic Materials & Processing*  
K. I. MATTHEWS, *Optoelectronic Packaging, Manufacturing & Reliability*  
M. ITZLER, *Photodetectors & Imaging*  
K. D. CHOQUETTE, *Semiconductor Lasers*  
M. DOWELL, *Optics & Electro-Optics Standards Council*  
K. MIDORIKAWA, *Short Wavelength and Gas Lasers*  
N. C. FERNELIUS, *Solid State Lasers*  
B. KOLNER, *Ultrafast Optics & Electronics*

**Vice President (Publications)**—J. J. COLEMAN

A. E. WILLNER, *IEEE/OSA Journal of Lightwave Technology Editor*  
N. DAGLI, *IEEE Photonics Technology Letters Editor*

## THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

## Officers

ARTHUR W. WINSTON, <i>President</i>	MICHAEL R. LIGHTNER, <i>Vice President, Publication Services and Products</i>
W. CLEON ANDERSON, <i>President-Elect</i>	MARC T. APTER, <i>Vice President, Regional Activities</i>
MOHAMED EL-HAWARY, <i>Secretary</i>	JAMES T. CARLO, <i>President, IEEE Standards Association</i>
PEDRO A. RAY, <i>Treasurer</i>	RALPH W. WYNDRUM, JR., <i>Vice President, Technical Activities</i>
MICHAEL S. ADLER, <i>Past President</i>	JOHN W. STEADMAN, <i>President, IEEE-USA</i>
JAMES M. TIEN, <i>Vice President, Educational Activities</i>	

CARY Y. YANG, *Director, Division I—Circuits and Devices*

## Executive Staff

DONALD CURTIS, <i>Human Resources</i>	MATTHEW LOEB, <i>Corporate Strategy &amp; Communications</i>
ANTHONY DURNIAK, <i>Publications Activities</i>	RICHARD D. SCHWARTZ, <i>Business Administration</i>
JUDITH GORMAN, <i>Standards Activities</i>	W. THOMAS SUTTLE, <i>IEEE-USA</i>
CECELIA JANKOWSKI, <i>Regional Activities</i>	MARY WARD-CALLAN, <i>Technical Activities</i>
BARBARA COBURN STOLER, <i>Educational Activities</i>	

## IEEE Periodicals

## Transactions/Journals Department

*Staff Director:* FRAN ZAPPULLA  
*Editorial Director:* DAWN MELLELY  
*Production Director:* ROBERT SMREK  
*Managing Editor:* JEFFREY E. CICHOCKI  
*Associate Editor:* EILEEN MCGUINNESS

IEEE PHOTONICS TECHNOLOGY LETTERS (ISSN 1041-1135) is published monthly by the Institute of Electrical and Electronics Engineers, Inc. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society/Council, or its members. **IEEE Corporate Office:** 3 Park Avenue, 17th Floor, New York, NY 10016-5997. **IEEE Operations Center:** 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. **NJ Telephone:** +1 732 981 0060. **Price/Publication Information:** Individual copies: IEEE Members \$10.00 (first copy only), nonmembers \$20.00 per copy. (Note: Add \$4.00 postage and handling charge to any order from \$1.00 to \$50.00, including prepaid orders.) Member and nonmember subscription prices available upon request. Available in microfiche and microfilm. **Copyright and Reprint Permissions:** Abstracting is permitted with credit to the source. Libraries are permitted to photocopy for private use of patrons, provided the per-copy fee indicated in the code at the bottom of the first page is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For all other copying, reprint, or republication permission, write to Copyrights and Permissions Department, IEEE Publications Administration, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. Copyright © 2004 by the Institute of Electrical and Electronics Engineers, Inc. All rights reserved. Periodicals Postage Paid at New York, NY and at additional mailing offices. **Postmaster:** Send address changes to IEEE PHOTONICS TECHNOLOGY LETTERS, IEEE, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. GST Registration No. 125634188. Printed in U.S.A.