

# SELECTED TOPICS IN QUANTUM ELECTRONICS

A PUBLICATION OF THE IEEE PHOTONICS SOCIETY



MARCH/APRIL 2016

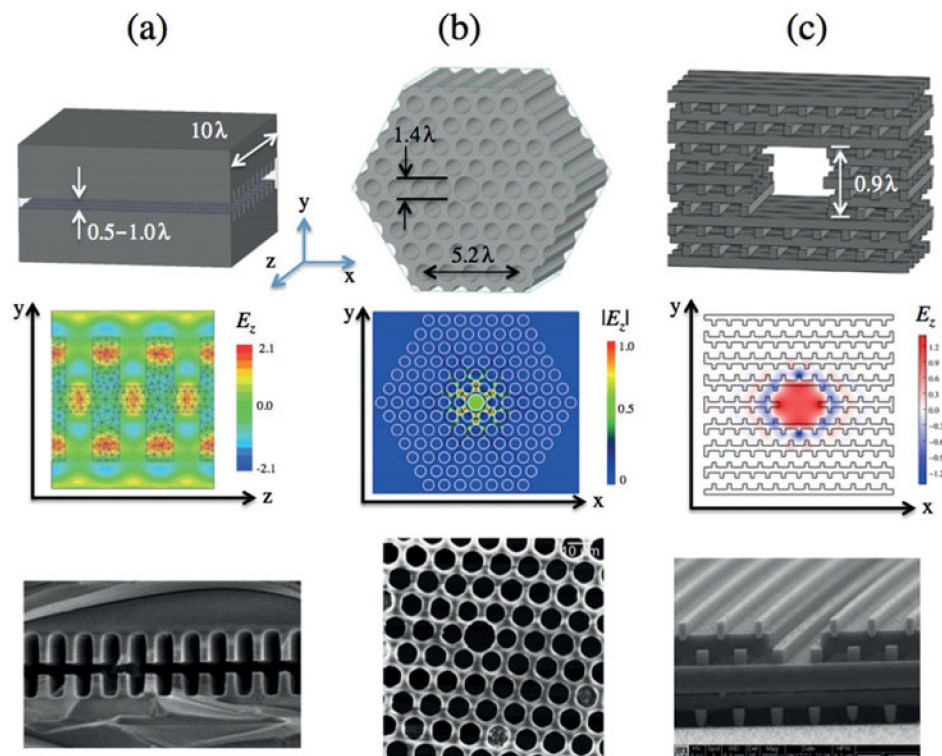
VOLUME 22

NUMBER 2

IJSQEN

(ISSN 1077-260X)

ISSUE ON OPTICAL WAVEGUIDE TECHNOLOGY AND APPLICATIONS



Two-dimensional and 3-D variations in dielectric constant showing (a) 1-D phase reset based on enclosed dual-grating geometry, (b) 2-D optical photonic bandgap fiber, and (c) a 3-D photonic crystal accelerator based on silicon.

The figure shows example geometries (top) in equivalent orientations relative to the z beam axis, simulations of longitudinal field (middle), and images of fabricated prototypes (bottom).

(R. Joel England, article number 4401007)

IEEE JOURNAL OF

# SELECTED TOPICS IN QUANTUM ELECTRONICS

A PUBLICATION OF THE IEEE PHOTONICS SOCIETY



MARCH/APRIL 2016

VOLUME 22

NUMBER 2

IJSQEN

(ISSN 1077-260X)

## ISSUE ON OPTICAL WAVEGUIDE TECHNOLOGY AND APPLICATIONS

### EDITORIAL

Introduction to the Issue on Optical Waveguide Technology and Applications .....  
..... A. C. Boucouvalas, A. Wilner, M. Zervas, S. Walker, and L. Schächterr 0200203

### FIBER LASERS

Topological Insulator-Assisted Dual-Wavelength Fiber Laser Delivering Versatile Pulse Patterns .....  
..... B. Guo, Y. Yao, J.-J. Xiao, R.-L. Wang, and J.-Y. Zhang 0900108

### MODE-LOCKED LASERS

Ultrafast High-Repetition-Rate Waveguide Lasers (*Invited Paper*) ..... D. P. Shepherd, A. Choudhary,  
A. A. Lagatsky, P. Kannan, S. J. Beecher, R. W. Eason, J. I. Mackenzie, X. Feng, W. Sibbett, and C. T. A. Brown 1100109  
Generalized Analytical Model for Dissipative Soliton in All-Normal-Dispersion Mode-Locked Fiber Laser .....  
..... H. Kotb, M. Abdelalim, and H. Anis 1100209  
Semiconductor Diode Laser Mode-Locking by a Waveguide Array ... X. Zhang, M. Williams, S. T. Cundiff, and J. N. Kutz 1100306

### QUANTUM WELL/DASH/DOT DEVICES

#### Systems/Components

All-Optical Modulation in Si Quantum Dot-Doped SiO<sub>x</sub> Micro-Ring Waveguide Resonator .....  
..... S.-P. Su, C.-L. Wu, Y.-H. Lin, and G.-R. Lin 1900109

### OPTICAL WAVEGUIDES

Group Polarimetric Pressure Sensitivity of an Elliptical-Core Side-Hole Fiber at Telecommunication Wavelengths .....  
..... J. Sadeghi, H. Latifi, M. Murawski, F. Mirkhosravi, T. Nasilowski, P. Mergo, and K. Poturaj 4400206  
Numerical Modeling of Pump Absorption in Coiled and Twisted Double-Clad Fibers .....  
..... P. Koška, P. Peterka, and V. Doya 4401508

#### Systems/Components

Theoretical Comparative Analysis of BER in Multi-Channel Systems With Strip and Photonic Crystal Silicon Waveguides  
..... J. You, S. Lavdas, and N. C. Panoiu 4400810

(Contents Continued on Next Page)



---

Performance of Planar, Rib, and Photonic Crystal Silicon Waveguides in Tailoring Group-Velocity Dispersion and Mode Loss . . . . .	<i>R. H. Khandokar, M. Bakaul, S. Skafidas, T. Nirmalathas, and M. Asaduzzaman</i>	4401308
The Role of Effective Area in the Design of Weakly Coupled MCF: Optimization Guidance and OSNR Improvement . . . . .	<i>B. Li, L. Gan, S. Fu, Z. Xu, M. Tang, W. Tong, and P. P. Shum</i>	4401407
Fast and Chaotic Fiber-Based Nonlinear Polarization Scrambler . . . . .	<i>M. Guasoni, P.-Y. Bony, M. Gilles, A. Picozzi, and J. Fatome</i>	4402012
Design of Optical Waveguides Carrying LP <sub>01</sub> Mode for WDM Systems . . . . .	<i>A. Goel and G. Pandey</i>	4402208
<i>Large Mode Area Fibers</i>		
Very Large-Mode-Area, Symmetry-Reduced, Neodymium-Doped Silicate Glass All-Solid Large-Pitch Fiber . . . . .	<i>L. Wang, D. He, C. Yu, S. Feng, L. Hu, and D. Chen</i>	4400105
The Improved Definitions for Mode-Field Radius and Divergence Half-Angle of Optical Fiber . . . . .	<i>L. Li and F. Guo</i>	4400404
Bend Resistant Large Mode Area Fiber With Multi-Trench in the Core . . . . .	<i>X. Wang, S. Lou, W. Lu, X. Sheng, T. Zhao, and P. Hua</i>	4400508
Extending the Limits in Optical-Fiber Design for Higher Power Applications Using Inverse Transmission-Line Techniques . . . . .	<i>A. C. Boucouvalas and C. A. Thraskias</i>	4401707
Inverse Scattering Designs of Active Multimode Waveguides With Tailored Modal Gain . . . . .	<i>A. R. May and M. N. Zervas</i>	4401807
Characteristics of Few Mode Fiber Under Bending . . . . .	<i>J. Su, X. Dong, and C. Lu</i>	4402307
<i>Hollow Core Fibers</i>		
Negative Curvature Hollow-Core Optical Fiber ( <i>Invited Paper</i> ) . . . . .	<i>F. Yu and J. C. Knight</i>	4400610
Low-Loss Hollow-Core Anti-Resonant Fibers With Semi-Circular Nested Tubes . . . . .	<i>M. S. Habib, O. Bang, and M. Bache</i>	4402106
<i>Optical Fibers for Particle Acceleration</i>		
A Traveling-Wave Forward Coupler Design for a New Accelerating Mode in a Silicon Woodpile Accelerator . . . . .	<i>Z. Wu, C. Lee, K. P. Wootton, C.-K. Ng, M. Qi, and R. J. England</i>	4400909
Review of Laser-Driven Photonic Structure-Based Particle Acceleration ( <i>Invited Paper</i> ) . . . . .	<i>R. J. England</i>	4401007
Input Coupling for Photonic Bandgap Fiber Accelerators . . . . .	<i>R. J. England, A. Kwiatkowski, C.-K. Ng, and Z. Wu</i>	4401109
<i>Numerical Techniques</i>		
The Mixed Finite-Element Method With Mass Lumping for Computing Optical Waveguide Modes . . . . .	<i>N. Liu, G. Cai, C. Zhu, Y. Huang, and Q. H. Liu</i>	4400709
Supermodes in Coupled Multi-Core Waveguide Structures ( <i>Invited Paper</i> ) . . . . .	<i>C. Xia, M. A. Eftekhar, R. A. Correa, J. E. Antonio-Lopez, A. Schülzgen, D. Christodoulides, and G. Li</i>	4401212
<i>Chalcogenide Fibers</i>		
Sub-Wavelength Dual Capillaries-Assisted Chalcogenide Optical Fibers: Unusual Modal Properties in Mid-IR (2–5 $\mu\text{m}$ ) Spectral Range . . . . .	<i>V. Mishra, S. P. Singh, R. Haldar, and S. K. Varshney</i>	4401906
<i>Terahertz Generation and Fibers</i>		
Investigation of Flexible Low-Loss Hollow-Core Fibres With Tube-Lattice Cladding for Terahertz Radiation . . . . .	<i>W. Lu, S. Lou, and A. Argyros</i>	4401607
<i>Liquid Crystal Techniques</i>		
Light-Induced Waveguides in Nematic Liquid Crystals . . . . .	<i>G. Assanto and N. F. Smyth</i>	4400306
<hr/> GUIDED-WAVE DEVICES		
Femtosecond Laser Inscribed Y-Branch Waveguide in Nd:YAG Crystal: Fabrication and Continuous-Wave Lasing . . . . .	<i>H. Liu, J. R. V. de Aldana, M. Hong, and F. Chen</i>	4500204
<hr/> PLASMONICS		
Nanoscale Surface Plasmon Polariton Disk Resonators, a Theoretical Analysis . . . . .	<i>X. Sun, L. Wosinski, and L. Thylén</i>	4600106
Magnetically-Controlled Logic Gates of Graphene Plasmons Based on Non-Reciprocal Coupling . . . . .	<i>B. Zhu, G. Ren, Y. Gao, B. Wu, C. Wan, and S. Jian</i>	4600307
Dispersion of Surface Plasmon Polaritons on a Metallic Grating . . . . .	<i>I-T. Lin, Y.-P. Lai, C. Fan, and J.-M. Liu</i>	4600407

---

---

PHOTONIC CRYSTAL TECHNOLOGY

*Photonic Bandgap Fibers*

Mode-Selective Characteristics of an Optical Fiber With a High-Index Core and a Photonic Bandgap Cladding . . . . . *M.-Y. Chen and K. S. Chiang* 4900307

Asymmetric Oval-Shaped-Hole Photonic Crystal Waveguide Design by Artificial Intelligence Optimizers . . . . . *S. M. Mirjalili and S. Z. Mirjalili* 4900407

Coexistence of Photonic Bandgap Guidance and Total Internal Reflection in Photonic Crystal Fiber Based on a High-Index Array With Internal Air Holes . . . . . *P. Lin, Y. Li, T. Cheng, T. Suzuki, and Y. Ohishi* 4900606

*Chalcogenide Fibers*

Slow Light in Square-Lattice Chalcogenide Photonic Crystal Holey Fibers . . . . . *J. Hou, D. S. Citrin, Z. Cao, C. Yang, Z. Zhong, and S. Chen* 4900108

Ultra-Wide Mid-Infrared Supercontinuum Generation in As<sub>40</sub>Se<sub>60</sub> Chalcogenide Fibers: Solid Core PCF Versus SIF . . . . . *H. Saghaei, M. K. Moravvej-Farshi, M. Ebnali-Heidari, and M. N. Moghadasi* 4900508

Analysis and Design of Single-Mode As<sub>2</sub>Se<sub>3</sub>-Chalcogenide Photonic Crystal Fiber for Generation of Slow Light With Tunable Features . . . . . *R. K. Sinha, A. Kumar, and T. S. Saini* 4900706

*Systems/Components*

Transforming Unidirectional Edge Waveguide Into Unidirectional Air Waveguide . . . . . *Y.-T. Fang, H.-Q. He, and J.-X. Hu* 4901109

*Liquid Crystal Techniques*

Ultrahigh Soliton Pulse Compression Through Liquid Crystal Photonic Crystal Fiber . . . . . *R. A. Hussein, M. F. O. Hameed, and S. S. A. Obayya* 4900908

*Numerical Techniques*

Efficient Photonic-Crystal Mode Solver: Eigenvalue Rather Than Generalized Eigenvalue Approach . . . . . *P.-J. Chiang and S.-W. Chang* 4901206

*Large Mode Area Fibres*

Large-Mode-Area All-Solid Photonic Bandgap Fibers for the Mitigation of Optical Nonlinearities (*Invited Paper*) . . . . . *L. Dong, F. Kong, G. Gu, T. W. Hawkins, M. Jones, J. Parsons, M. T. Kalichevsky-Dong, K. Saitoh, B. Pulford, and I. Dajani* 4900207

Analysis of the Modal Content Into Large-Mode-Area Photonic Crystal Fibers Under Heat Load . . . . . *E. Coscelli, R. Dauliat, F. Poli, D. Darwich, A. Cucinotta, S. Selleri, K. Schuster, A. Benoît, R. Jamier, P. Roy, and F. Salin* 4900808

---

FIBER-BASED SENSORS

Miniature pH Optical Fiber Sensor Based on Fabry-Perot Interferometer . . . . . *Y. Zheng, L. H. Chen, X. Dong, J. Yang, H. Y. Long, P. L. So, and C. C. Chan* 5600205

---

PHOTONIC INTEGRATED CIRCUITS

Stimulated Brillouin Scattering in Photonic Integrated Circuits: Novel Applications and Devices (*Invited Paper*) . . . . . *M. Merklein, A. Casas-Bedoya, D. Marpaung, T. F. S. Büttner, M. Pagani, B. Morrison, I. V. Kabakova, and B. J. Eggleton* 6100111

---

SILICON PHOTONICS SCIENCE

Opportunities for Wideband Wavelength Conversion in Foundry-Compatible Silicon Waveguides Covered With Graphene . . . . . *N. Vermeulen, J. Cheng, J. E. Sipe, and H. Thienpont* 8100113

---

TERAHERTZ TECHNOLOGY

High-Power High-Brightness Terahertz Source Based on Nonlinear Optical Crystal Fiber . . . . . *P. Liu, W. Shi, D. Xu, X. Zhang, J. Yao, R. A. Norwood, and N. Peyghambarian* 8500105

Specialty Fibers for Terahertz Generation and Transmission: A Review (*Invited Paper*) . . . . . *A. Barh, B. P. Pal, G. P. Agrawal, R. K. Varshney, and B. M. A. Rahman* 8500215

---

QUANTUM ELECTRONICS TECHNOLOGY

*Systems/Components*

A Review of Single-Mode Fiber Optofluidics (*Invited Paper*) . . . . . *R. Blue, A. Duduś, and D. Uttamchandani* 9100112

*(Contents Continued from Previous Page)*

---

ANNOUNCEMENTS

Call for Papers—IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS Issue on Photonics for Sensing . . . . .	9800601
Call for Papers—IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS Issue on Reports from the Invited and Postdeadline Speakers of CLEO 2016 . . . . .	9800701
Call for Papers—IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS Issue on Terahertz Photonics . . . . .	9800801
Call for Papers—IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS Issue on Semiconductor Nanocrystals . . . . .	9800901
Call for Papers—IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS Issue on Indium Phosphide Integrated Photonics . . . . .	9801001

---