2007 International Conference on Numerical Simulation of Semiconductor Optoelectronic Devices

Newark, DE
24-28 September 2007

IEEE Catalog Number: CFP07817-PRT
ISBN 10: 1-4244-1431-8
ISBN 13: 978-1-4244-1431-4

Table of Contents

Monday, 24 September 2006

MA Novel Materials

MA1 Low refractive index films: A new class of optical thin film materials for optoelectronic applications (**invited**)
Jong Kyu Kim and E. Fred Schubert, Rensselaer Polytech. Inst., Troy, NY 1

MA2 Hot Carrier Dynamics and Coherent Effects in GaN under Short Laser Pulse Excitation
S. Rudin (1), E. Bellotti (2), G. A. Garrett (1), and M. Wraback (1); (1) US Army Research Laboratory, Adelphi, MD; (2) Electrical and Computer Engineering Department, Boston University, Boston, MA 3

MA3 Simulations of 2D Maxwell-Bloch equations
Jingyi Xiong (1), Max Colice (1), Friso Schlottau (1), Kelvin Wagner (1) and Bengt Fornberg (2) ; (1) Optoelectronic Computing Systems Center, Dept of ECE, University of Colorado, Boulder, CO; (2) Department of Applied Mathematics, University of Colorado, Boulder, CO 5

MA4 Near and far field observation of optical confinement in non-destructive fabricated organic photonic dots
Maik Langner, Robert Gehlhaar, Clemens Schriever, Hartmut Froeb, Vadim G. Lyssenko and Karl Leo; Institut for Applied Photophysics, Techn. Univ. Dresden, Germany 7

MA5 DNA-Wrapped Carbon Nanotubes as Potential Optoelectronic Materials
Stacy E. Snyder and Slava V. Rotkin; Physics Department, Lehigh University, Bethlehem, PA 9

MB Laser Diodes I

MB1 Simulation and optimization of high-power semiconductor lasers and modules (**invited**)
Nicolai Matuschek, Bookham, Switzerland 11

MB2 Thermal lensing in high–power ridge–waveguide lasers
Hans Wenzel, M. Dallmer and G. Erbert; Ferdinand–Braun–Institute, Berlin, Germany 13

MB3 Thermal Boundary Resistance in Optoelectronic Devices
R. MacKenzie, J.J. Lim, S. Bull, S. Sujecki and E.C. Larkins; School of Electrical and Electronic Engineering, University of Nottingham, U.K. 15

MB4 Design and optimization of a GaAs-based sub-7-micron quantum cascade laser based on multivalley Monte Carlo simulation
X. Gao, M. D'Souza, D. Botez, and I. Knezevic; Department of Electrical and Computer Engineering, University of Wisconsin, Madison, WI 17

MB5 Thermal performance investigation of DQW GaInNAs laser diodes
J.J. Lim (1), R. MacKenzie (1), S. Sujecki (1), M. Sadeghi (2), S.M. Wang (2), Y.Q. Wei (2) and A. Larsson (2), P. Melanen (3), P. Uusimaa (3), A.A. George (4), P.M. Smowton (4) and E.C. Larkins (1); (1) The University of Nottingham, University Park, Nottingham, U.K. ; (2) Photonics Laboratory, Chalmers University of Technology, Göteborg, Sweden; (3) Modulight Inc., Tampere, Finland; (4) Cardiff School of Physics and Astronomy, Cardiff University, Cardiff, U.K. 19

Tuesday, September 25

TuA1 Light-Emitting Diodes

TuA1 Quantitative modeling of resonant photoluminescence in InGaN single-quantum-well LED structures (**invited**)
Matthias Sabathil, A. Laubsch, and N. Linder, OSRAM, Germany 21

TuA2 Coupled Modeling of Current Spreading, Thermal Effects, and Light Extraction in III-Nitride Light-Emitting Diodes
M. V. Bogdanov, K. A. Bulashevich, I. Yu. Evstratov, and S. Yu. Karpov; STR, Inc., Richmond, VA 23

TuA3 Enhanced light extraction from textured surfaces with sub-wavelength size features: beyond the ray tracing approximation
S. Riyopoulos, SAIC, McLean, VA 25

TuB Nanostructures I

TuB2 Design of unidirectional subwavelength slit coupler for THz surface plasmons
Qiaoqiang Gan, Zhan Fu, Yujie J. Ding, Filbert J. Bartoli; Center for Optical Technologies, Electrical and Computer Engineering Department, Lehigh University, Bethlehem, PA 27

TuB3 Optical Waves Transmission Raised by Localized Surface Plasmons
S. C. Chen (1), K. P. Chiu (2) and D. P. Tsai (2); (1) Department of Electrical Engineering, Far East College, Taiwan, R.O.C.; (2) Dept. of Phys., Center of Nanostorage Research, National Taiwan University, R.O.C. 29

TuB4 Intersubband Antipolariton: A New Quasiparticle
M.F. Pereira, Materials and Engineering Research Institute, Sheffield Hallam University, U.K. 31

TuP Poster Session

TuP1 Modeling Ultra Short Optical Pulse Propagation In Integrated Optical Waveguides Using A New Time Domain Technique
Husain M. Masoudi; King Fahd University of Petroleum and Minerals, Saudi Arabia 33

TuP2 White Organic Light-Emitting Diodes Based on Dual Partial Dye Doping
Jongwoon Park(a), Seounghwan Park (b), Bumho Choi (a), and Jongho Lee (a); (a) Korea Institute of Industrial Technology, Gwangju, South Korea; (b) Catholic University of Daegu, Gyeongsan, South Korea 35

TuP3 Two-Dimension Simulation of Gallium Nitride-Based Laser Diode
X. Jin (1), B. Zhang (2), S. Jobe (1), J. DeLeon (1), J. Flickinger (1), T. Dai (2) G. Zhang (2), E. Heller (3), and L. Chen (3); (1) California Polytechnic State University, San Luis Obispo, CA ; (2) Peking University, Beijing, China; (3) RSoft Design Group, Inc, Ossining, NY 37

TuP7 Gallium Arsenide Photodiode Simulation
J. Flickinger (1), X. Jin (1), E. Heller (2) and L. Chen (2); (1) California Polytechnic State University, San Luis Obispo, CA ; (2) RSoft Design Group, Inc, Ossining, NY 39

TuP8 Monte Carlo Simulation of Excess Noise in Heterojunction Avalanche Photodetector ;
A. Gosh and K. K. Gosh, Centre for Sience Education and Research, Calcutta, India 41

TuP9 Modeling and Simulation of GaN/AlGaN Laser and Temperature Dependent Analysis of Physical Parameters
S. A. Gaikwad, D. S. Patil and D. K. Gautam, North Maharashtra University, Jalgaon, India 43

TuP11 Three-Dimensional VCSEL Simulation Using Vector Finite Elements
Peter Nyakas, Furukawa Electric Institute of Technology, Budapest, Hungary 45

TuP12 Simulation of quantum wells with ‘spikes’ and ‘dips’
Antti Laakso, Mihail Dumitrescu, Lauri Toikkanen, Antti Tukiainen, Ville Rimpiläinen and Markus Pessa; ORC, Tampere University of Technology, Tampere, Finland 47

TuP13 Finite difference time domain analysis for measuring transmission and reflection coefficients in negative index materials
Jae-Hong Park and Iam-Choon Khoo; Department of Electrical Engineering, Pennsylvania State University, University Park, PA 49

TuP14 Nitride Band-Structure Model in a Quantum Well Laser Simulator
Anusha Venkatachalam, Paul. D. Yoder, Benjamin Klein and Aditya Kulkarni, Georgia Institute of Technology, Savannah, GA 51

TuP15 A Simple Iterative Model for Oxide-Confined VCSELs
Hsueh-hua Chuang (1), James R. Biard (2), Jim Guenter (2), Ralph Johnson (2), and Gary A. Evans (1); (1) Southern Methodist University, Dallas, TX; (2) Finisar, Allen, TX 53

TuP16 Two Dimensional Modeling of Interdigitated Back Contact Silicon Heterojunction Solar Cells
Meijun Lu (1,2), Stuart Bowden (1) and Robert Birkmire (1,2); (1) Institute of Energy Conversion, University of Delaware, Newark, DE ; (2) Department of Physics and Astronomy, University of Delaware, Newark, DE 55

TuP17 Stretched input-output characteristic in inhomogeneously broadened lasing system;
S.I. Hintschich, M. Langner, H. Gothe, V.G. Lyssenko, H. Fröb, and K. Leo; Institute of Applied Photophysics, Techn. Univ., Dresden, Germany 57

Wednesday, September 26

WA Novel Devices

WA1 Features of light to current transformations in organic devices (invited)
Ajay K. Pandey (1) and Jean-Michel Nunzi (2); (1) University of St Andrews, U. K., (2) Queen's University, Canada 59

WA3 Simulation of Photodetection Using FDTD Method with Application to Near-Field Subwavelength Imaging Based on Nanoscale Semiconductor Photodetector Array
Ki Young Kim, Yingyan Huang, Boyang Liu, and Seng-Tiong Ho; Northwestern University, Evanston, IL 61

WA4 Detailed Numerical Modeling of a Novel Infrared Single Photon Detector for $\lambda > 1\mu m$
O.G. Memis, W. Wu, D. Dey, A. Katsnelson and H. Mohseni; Northwestern University, Evanston, IL 63

WB Laser Diodes II

WB1 Full Wave Electromagnetics for Simulating Terahertz Quantum Well Laser Diode Modulation
Matt Grupen (1), Paul Sotirelis (1), Steve Wong (1), John Albrecht (2), Robert Bedford (2), Sarah Maley (2), Tom Nelson (2), Bill Siskaninetz (2) ; (1) High Performance Technologies, Inc., Reston, VA; (2) US Air Force Research Lab, Wright-Patterson AFB, OH 65

WB2 Large-Signal Modeling on Device Level: Intermodulation Distortion and Eye-Diagrams of Semiconductor Lasers
Stefan Odermatt (1), Bernd Witzigmann (2), and Bernhard Schmithuesen (1); (1) Synopsys Switzerland LLC, Zurich, Switzerland; (2) ETH Zurich, Switzerland 67

WB3 Optical Gain Analysis of Strain Compensated InGaN–AlGaN Quantum Well Active Regions for Lasers Emitting at 420-500 nm
Hongping Zhao, Ronald A. Arif, Yik-Khoon Ee, and Nelson Tansu; Lehigh University, Bethlehem, PA 69

WB5 The Effect of Gain-Coupling on Mode Beatings in Weakly Coupled Two-Section DFB Lasers
M. Al-Mumin, College of Technological Studies, Shuwaikh, Kuwait 71

WB6 Time-domain simulation of semiconductor laser light with correlated amplitude and phase noise
D. Lasaosa, M. Vega-Leal, and C. Fananas; Public Univ. of Navarra, Pamplona, Spain 73

WC Photodetectors and Solar Cells

WC1 High-speed photodetection exploiting quasi-unipolar charge transport (**invited**)
Douglas Yoder, Georgia Institute of Technology, Savannah, GA 75

WC2 Theory and Modelling of High-Field Carrier Transport in High-Speed Photodetectors
N.A. Zakhleniuk; ESE Department, University of Essex, Colchester, Essex, U.K. 77

WC3 Characterization and Optimization of InGaAs/InP Photodiodes with High Saturation Current
Huapu Pan, Xin Wang, Andreas Beling, Hao Chen, and J. C. Campbell; Univ. of Virginia, Charlottesville, VA 79

WC4 Electronic structure of QD arrays: Application to intermediate-band solar cells
S. Tomic (a), N. M. Harrison (a;b), and T.S. Jones (c); (a) STFC Daresbury Laboratory, Cheshire, U.K.; (b) Department of Chemistry, Imperial College, London, U.K.; (c) Department of Chemistry, University of Warwick, Coventry, U.K. 81

WC5 Existence of bounded discrete steady state solutions of the van Roosbroeck system on boundary conforming Delaunay grids
K. Gaertner, WIAS Institute, Berlin, Germany 83

Thursday, September 27

ThA Nanostructures II

ThA1 Design issues of 1.55 um emitting GaInNAs quantum dots
Stanko Tomic; STFC Daresbury Laboratory, Cheshire, U.K. 85

ThA2 Dynamical Model for Coherent Optical Control of a Single Confined Spin
G. Slavcheva, University of Surrey, Guildford, U.K. 87

ThA3 Simulation of Derivative Characteristics of Broadband Quantum Dot Lasers
C. L. Tan, Y. Wang, H. S. Djie, B. S. Ooi; Lehigh University, Bethlehem, PA 89

ThA4 Dynamical Semiconductor Medium FDTD Simulation of Current-Injection Nanophotonic Devices
Yingyan Huang and Seng-Tiong Ho; Northwestern University, Evanston, IL 91

ThB Photonic Circuits and Fiber Optics

ThB1 Numerical Analysis of Four-Wave Mixing between 2 ps mode-locked laser pulses in a Tensile-Strained Bulk SOA
Michael J. Connelly (a), Liam P. Barry (b), Brendan F. Kennedy (c) and Douglas A. Reid (b); (a) University of Limerick, Limerick, Ireland; (b) Dublin City University, Dublin, Ireland; (c) Universidad de Santiago, Chile 93

ThB2 Simulation of Static Optical XPM in Active MMI Couplers
Salah Ibrahim, Xueliang Song, Masakazu Sugiyama and Yoshiaki Nakano; Research Center for Advanced Science and Technology, University of Tokyo, Japan 95

ThB3 Gain-Power Trade-Off in Low-Confinement Semiconductor Optical Amplifiers
Paul W. Juodawlkis and Jason J. Plant; Massachusetts Institute of Technology, Lexington, MA 97

ThB4 Non-Raman redshift by pulse splitting
Ayhan Demircan(1), Marcel Kroh (2), Monika Pietrzyk (1), Bernd Huttl (3) and Uwe Bandelow(1); (1) WIAS Institutes, Berlin, Germany; (2) u2t Photonics AG, Berlin, Germany; (3) Heinrich-Hertz-Institute, Berlin, Germany 99

ThB5 Designing of EDFA with Inherently Low Transient Response for Optical Packet with Variable Condition of Traffic on WDM Environment
Yoshinari Awaji (1), Hideaki Furukawa (1), Naoya Wada (1), Eddie Kong (2), Peter Chan (2), Ray Man (2); (1) National Institute of Information and Communications Technology (NICT), Tokyo, Japan; (2) Amonics Ltd., Kowloon, Hong Kong 101

ThB6 Accelerated Simulators for Nano-Photonic Devices
Daniel K. Price, John R. Humphrey, and Eric J. Kelmelis; EM Photonics, Newark, DE 103