Yurii A. Vlasov, Ph.D.
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I. BIOGRAPHY

Dr.Vlasov is internationally recognized both as a highly accomplished scholar with major scientific discoveries in the area of extreme optical confinement at the nanoscale – nanophotonics, as well as an industrial engineer who has led the successful transition of this basic scientific knowledge into a real-world manufacturable technology. This disruptive Silicon Integrated Nanophotonics technology developed under the leadership of Dr.Vlasov at IBM and lately deployed at GlobalFoundries is enabling high-performance optical connectivity in supercomputers, intra/inter data centers, metro, and long-haul communications, while significantly reducing cost and maximizing energy efficiency.

As a world-leading researcher, Dr.Vlasov has pioneered the experimental studies of silicon nanophotonics starting with the world-first demonstration of photonic band gap crystals via self-assembly (1995-2001), ultra-slow group velocity of light in nanophotonic resonators (1998-2005), ultra-compact silicon modulators (2005-2007), deeply-scaled germanium photodetectors (2005-2010), and broadband optical switches (2008-2014), as well as giant enhancement of nonlinear optical effects in nanophotonics structures (1998-2011).

As an engineer and industrial leader, Dr.Vlasov has transformed insights from his fundamental research into the invention and development of a library of manufacturable silicon nanophotonic components that included modulators, photodetectors, fiber couplers, switches and wavelength multiplexers that form a broad (>100) patent portfolio. Under Dr. Vlasov' leadership (2001-2015) the technology transitioned into a manufacturable fully-qualified industry-first silicon photonics solution built on sub-100 nm technology node and featuring monolithic integration of RF and digital elements, silicon nanophotonics and advanced packaging capabilities. After acquisition of IBM Microelectronics by Globalfoundries in 2014 the 90WG technology has been made generally available for commercial production (GF press-release 2018). The technology is being used for hyperscale cloud data centers and 5G network buildouts (GF press-release 2019).

II. APPOINTMENTS

2017-current	Inaugural Professor, Clinical Neuroscience, **Carle Illinois College of Medicine**, Urbana-Champaign, IL
2016-current	Grainger Engineering Breakthrough Initiative (GEBI) Founder Professor of Engineering, Department of Electrical and Computer Engineering, **University of Illinois at Urbana-Champaign**, IL
2013-2018	Senior Fellow and Visiting Scientist, **HHMI** Janelia Research Campus, VA
2014-2016	Manager, Department of Brain-Inspired Technologies, Principal Research Staff Member, **IBM** TJ Watson Research Center, NY
2008- 2013	Manager, Silicon Nanophotonics Project, Research Staff Member, **IBM** TJ Watson Research Center, NY
2007-2008	Adjunct Professor, ECE Department, **Columbia** University, NY
2001-2008	Project Lead, Silicon Nanophotonics, Research Staff Member, **IBM** TJ Watson Research Center, NY
2000-2001	Scientist, **NEC** Research Institute, Inc., Princeton NJ
1998-2000	Postdoctoral Member of Staff, **NEC** Research Institute, Inc., Princeton NJ
1996-1997	Postdoctoral Fellow, **Strasbourg Institute** of Materials Physics, France
1994-2000	Research Scientist, **Ioffe Institute** of Physics and Technology, Russia
1988-1994	Junior Research Scientist, **Ioffe Institute** of Physics and Technology, Russia

III. HONORS AND AWARDS

- **Outstanding Technical Achievement Award** **2015,** IBM
  IBM SVP-level award "pioneering work in Si Photonic switching for datacenters"
- **Fellow, IEEE** **2015,** IEEE
  "for contributions to silicon integrated nanophotonics"
- **Outstanding Technical Achievement Award** **2014,** IBM
  IBM SVP-level award "contributions to technologies for Exascale computing"
- **Corporate Achievement Award** **2012,** IBM
  The highest-rank IBM CEO-level award for "breakthroughs in Silicon Nanophotonics with applications in data communications"
- **"Best of IBM" Award** **2012,** IBM
  One of IBM's highest honors at the CEO level, shared by just 500 IBMers each year
- **Outstanding Technical Achievement Award** **2008,** IBM
  IBM SVP-level award "demonstration of nanophotonic communications devices and circuits"

- **Senior Member, IEEE** **2007**, IEEE
- **Fellow, American Physical Society** **2007,** APS
  "for contributions to the understanding of the photonic nanostructures including photonic crystals and silicon nanophotonics"
- **Fellow, Optical Society of America** **2006**, OSA
  "for outstanding contributions to photonic bandgap materials and silicon integrated nanophotonic circuits."
- **Outstanding Technical Achievement Award** **2006,** IBM
  IBM SVP-level award "for demonstration of tunable Slow Light in silicon nanophotonics"
- **"Scientist of the Year", SciAm50 Award** **2006**, Scientific American Journal
  "new technologies that exercise extraordinary control over light"
- **Research Postdoctoral Fellowship** **1996**, French Ministry of Education
  "photonic band gap materials"
- **Personal Research Grant** **1994**, International Science Foundation
  "optics of near-surface III-V quantum wells"
- **Prize of the Scientific Council of Ioffe Institute** **1989**, Ioffe Institute, St-Petersburg
  "fundamental optical studies of excitons in II-VI disordered solid alloys"

IV. ACADEMIC EDUCATION

PhD (Physics) **1994**, Ioffe Institute of Physics and Technology, St.-Petersburg, Russia
Thesis: «Optical spectroscopy of confined excitons in III-V near-surface quantum wells and II-VI solid alloys with plane stacking faults»
Advisor: Prof.A.Kaplyanskii, Elected Member of the Russian Academy of Sciences, Ioffe Physical-Technical Institute, St.-Petersburg, Russia

MS (Biophysics) **1988**, University of St.-Petersburg, Physics Department, Russia
Thesis: «Short-range order/disorder transition in liquid toluene: depolarized light scattering studies»
Advisor: Prof.N.Rozhdestvenskaya, University of St. Petersburg, St.-Petersburg, Russia

V. PUBLICATIONS

- ✓ Total number of publications **>300** including journal papers, refereed proceedings and book chapters
- ✓ Cumulative citation index Scholar: **19000**, h-factor:**61**
- ✓ Talks at conferences and symposia in total **> 200** including >**100** invited, plenary, tutorials**.**
- ✓ **>100** patents, including issued (>**65**) and pending (>**35**)

Google Scholar: https://scholar.google.com/citations?user=Jv43yloAAAAJ&hl=en&oi=ao

SELECTED PUBLICATIONS

1. A Novel Approach to Photonic Packaging Leveraging Existing High-Throughput Microelectronic Facilities, Tymon Barwicz, Yoichi Taira, Ted W Lichoulas, Nicolas Boyer, Yves Martin, Hidetoshi Numata, Jae-Woong Nah, Shotaro Takenobu, Alexander Janta-Polczynski, Eddie L Kimbrell, Robert Leidy, Marwan H Khater, Swetha Kamlapurkar, Sebastian Engelmann, Yurii A Vlasov, Paul Fortier, IEEE **Journal of Selected Topics in Quantum Electronics** 22 (6), 8200712 (2016)
2. Monolithic silicon integration of scaled photonic switch fabrics, CMOS logic, and device driver circuits, Benjamin G Lee, Alexander V Rylyakov, William MJ Green, Solomon Assefa, Christian W Baks, Renato Rimolo-Donadio, Daniel M Kuchta, Marwan H Khater, Tymon Barwicz, Carol Reinholm, Edward Kiewra, Steven M Shank, Clint L Schow, Yurii A Vlasov, **Journal of Lightwave Technology** 32 (4), 743-751 (2014) **Best paper award**
3. A 90nm CMOS Integrated Nano-Photonics Technology for 25Gbps WDM Optical Communications Applications, S. Assefa, S. Shank, W. Green, M. Khater, E. Kiewra, C. Reinholm, S. Kamlapurkar, A. Rylyakov, C. Schow, F. Horst, H. Pan, T. Topuria, P. Rice, D. M. Gill, J. Rosenberg, T. Barwicz, M. Yang, J. Proesel, J. Hofrichter, B. Offrein, X. Gu, W. Haensch, J. Ellis-Monaghan, and Y. Vlasov , IEEE **International Electron Devices Meeting**, **postdeadline** session 33.8, (2012) **(250 citations)**
4. High-throughput silicon nanophotonic wavelength-insensitive switch for on-chip optical networks, Y Vlasov, WMJ Green, F Xia, ***Nature Photonics*** 2 (4), 242-246, (2008) **(400 citations)**
5. Ultra-compact, low RF power, 10 Gb/s silicon Mach-Zehnder modulator, WM Green, MJ Rooks, L Sekaric, YA Vlasov, ***Optics Express*** 15 (25), 17106-17113, (2007) **(750 citations)**
6. Ultracompact optical buffers on a silicon chip, F Xia, L Sekaric, Y Vlasov, ***Nature Photonics*** 1 (1), 65-71, (2006) **(1100 citations)**
7. Losses in single-mode silicon-on-insulator strip waveguides and bends, YA Vlasov, SJ McNab, ***Opt. Express*** 12 (8), 1622-1631, (2004) **(900 citations)**

8. Active control of slow light on a chip with photonic crystal waveguides, YA Vlasov, M O'Boyle, HF Hamann, SJ McNab, ***Nature*** 438 (7064), 65-69, (2005) **(1300 citations)**
9. Ultra-low loss photonic integrated circuit with membrane-type photonic crystal waveguides, S McNab, N Moll, Y Vlasov, ***Optics Express*** 11 (22), 2927-2939, (2003) **(750 citations)**
10. On-chip natural assembly of silicon photonic bandgap crystals, YA Vlasov, XZ Bo, JC Sturm, DJ Norris, ***Nature*** 414 (6861), 289-293, (2001) **(1900 citations)**

LIST OF REPRESENTATIVE PATENTS **(about 100 total, >65 ISSUED AND >35 PENDING).**

9,243,784 Semiconductor photonic package
9,059,025 Photonics device and CMOS device having a common gate
8,923,665 Material structures for front-end of the line integration of optical polarization splitters and rotators
8,683,393 Integrated design environment for nanophotonics
8,633,067 Fabricating photonics devices fully integrated into a CMOS manufacturing process
8,614,116 Germanium photodetector
8,530,821 Low distortion high bandwidth adaptive transmission line for integrated photonics applications
8,526,090 Double layer interleaved p-n diode modulator
7,955,887 Techniques for three-dimensional circuit integration
7,515,793 Waveguide photodetector

VI. COURSES TAUGHT

University of Illinois at Urbana-Champaign, Electrical Engineering Department

- **ECE 452 "**Electromagnetic Fields and Electro-optics" **Fall 2016, Fall 2017, Fall 2018**
- **ECE 498 "**Silicon Integrated Photonics" **Spring 2017, Spring 2018, Spring 2019**
- **BSE 634** "Clinical Neuroscience", Carle Illinois College of Medicine, **Spring 2019**

CLEO/QELS conference

- **SC466 Short course "**Silicon Integrated Photonics" **2018, 2019**

Columbia University, Electrical Engineering Department

- **ELEN E4944 "**Principles of Device Microfabrication" **Fall 2008**
- **ELEN E9402** Seminar in Quantum Electronics "Advanced Topics in Nanophotonics and Plasmonics" **Fall 2007**

VII. STUDENTS SUPERVISED

University of Illinois at Urbana-Champaign

- **Graduate Students**
  - Yan Zhang (ECE), M.S., Tsinghua (Instrument Science and Technology), 2017
  - Yifei Yang (ECE), B.S. Tsinghua (Materials Science and Engineering), 2017
  - Ari Esters (ECE), B.S., Stanford (Chemical Engineering), 2015
  - Oscar Bi (ECE), B.S., UIUC (Electrical Engineering), 2016
  - Prasoon Jha (ECE), B.S., Toronto (Electrical Engineering), 2018
  - Christopher Brenden (BioE), B.S., New Mexico (Chemical Engineering), 2018
  - Colin Graber (CS), B.S. Purdue (CS), 2015
  - Xingyu Chen (BioE). M.S., UIUC (BioEng), 2018, B.S., Shanghai Jiao Tong (BioMedical) 2017
  - Yuan Zhu (BioE), M.S., UIUC (BioEng), 2018, B.S., Shanghai Jiao Tong (BioMedical) 2017
  - Wang Zhen (BioE), M.S., UIUC (BioEng) 2018, B.S., Shanghai Jiao Tong (BioMedical) 2017

- **Postdoctoral Scientist**
  - Dr. Ryan Loh, PhD. UIUC (Psychology & Neuroscience), 2017
  - Dr. Sangho Kim, PhD. CMU (Electrical Engineering), 2019

IBM TJ Watson Research Center

- **Supervised Summer Intern Students**
  - Jonathan Leu (MIT) "Approaches for automated CAD design of optical circuits" 2008
    Currently graduate student at MIT
  - Xiaoping Liu (Columbia Un.) "Nonlinear silicon nanophotonics" 2009
    Currently Professor at Nanjing University
  - Christopher Kang (Vanderbilt Un.) "Photonics crystal cavities for chemical sensing" 2010
    Currently Engineer at Intel
  - Bart Kuyken (Ghent Un.) "Mid-infrared nonlinear optics in silicon waveguides" 2011
    Currently graduate student at Ghent University

- Wesley Sacher (Un.Toronto) "Polarization management in silicon nanophotonics" 2011
  Currently postdoctoral scientist at Caltech
- Mackenzie Van Camp (MIT) "Mid-infrared nonlinear optics in nanophotonics" 2011
  Currently Principal Scientist at BAE Systems
- Anietie Andy (Howard) "Convolutional neural networks" 2015
- Sebastian Oberg (KTH) "Stream dimensionality reduction for neural networks" 2015
- Stefano Recanatesi (Weizmann) "Advanced neural networks algorithms" 2015

o **Postdoctoral Scientists**
- Eric Dulkeith (TU Munich) "Optical nonlinearities in silicon photonic crystal waveguides" 2003-2005
  Currently Director at Detecon
- Fengnian Xia (Princeton) "Slow light in coupled resonators" 2005-2007
  Currently Assoc. Professor at Yale
- William Green (Caltech) "Silicon modulator" 2006-2007
  Currently Senior Manager at IBM Research
- Joris Van Campenhout (Ghent) "Broadband optical switches" 2007-2009
  Currently Director at IMEC
- Jin Hong Park (Stanford) "Dark current reduction in germanium MSM photodetectors" 2009-2010
  Currently Ass. Professor at Sungkyunkwan University
- Jessie Rosenberg (Caltech) "Microring silicon modulators" 2010-2011
  Currently Manager at IBM Research
- Jon Proesel (CMU) "CMOS analog circuits design for nanophotonics" 2010-2012
  Currently Research Staff Member at IBM Research
- Huapu Pan (Virginia Tech) "Photodetectros and integrated nanophotonics receivers" 2010-2012
  Currently Quant at Citadel LLC
- Seyoung Kim (UT Austin) "Neuromorphic RRAM devices" 2014-2015
  Currently Research Staff Member at IBM Research

VIII. PROFESSIONAL INVOLVEMENT AND RECOGNITION

CONFERENCE /SYMPOSIUM ORGANIZATION

o **Steering Committee**, Quantum Electronics and Laser Science Conference, 2018
o **General Co-Chair**, Quantum Electronics and Laser Science Conference, 2017
o **Program Co-Chair**, Quantum Electronics and Laser Science Conference, 2015
o **Co-Founder** of a novel programming area on ComputerCom in a major professional conference and industrial trade-show **Optical Fiber Communications** through a series of workshops (2008), special Symposia (2009, 2010) and finally a new Committee on "Optics for Computercom and Data Centers" (2011)
o **Chair**, Committee "Optical Dispersion Compensation", Optical Fiber Communications, 2010
o **Chair,** Workshop on "Can Integrated Photonics Enable Optical Interconnection Networks in Advanced Computing" (2009)
o **Chair**, Workshop on "Integrated Nanophotonics", Optical Fiber Communications, 2008
o **Member**, Committee "Optical Dispersion Compensation", Optical Fiber Communications, 2008-2009
o **Member**, Organizing Committee, Nonlinear Optics, **OSA** Topical, Hawaii, 2006, 2007, 2008, 2009
o **Member**, Organizing Committee, "Photonic Metamaterials: from Random to Periodic", **OSA** Topical Meeting, Jackson Hole, WA, 2007
o **Member**, Advisory Committee, VII Symposium on Photonic and Electromagnetic Crystal Structures, Monterey, CA, 2007
o **Chair**, Committee on "Fundamentals of Metamaterials, Random and Periodic Media", **CLEO/QELS** 2006
o **Member**, Organizing Committee, "Photonic Metamaterials: from Random to Periodic", **OSA** Topical Meeting, Bahamas, 2006
o **Member**, Organizing Committee, IEEE LEOS Annual Meeting, Sydney, Australia, October 2005.
o **Member**, Advisory Committee, VI Symposium on Photonic and Electromagnetic Crystal Structures, NATO ASI, 2005
o **Member**, Organizing Committee, Nanophotonics for Information Systems, OSA Topical, San Diego, 2005
o **Member**, Organizing Committee, "Fundamentals of Metamaterials, Random and Periodic Media", CLEO/QELS 2004, 2005
o **Member**, Organizing Committee, **OSA** Topical meeting "Integrated Photonics Research", Washington 2004.
o **Member**, Organizing Committee, "Waves in Random and Periodic Media", **CLEO/QELS** 2003
o **Co-Chair**, "Holey fibers and photonic crystals" **LEOS** Summer Topical Meeting 2003
o **Chair**, Symposium on "Microphotonics – Materials and Applications", **MRS** Fall Meeting 2002

- **Member**, Organizing Committee, "Novel Optics and Photonic Crystals", **CLEO/QELS** 2000

CONTRIBUTIONS TO IEEE STANDARDS

Introduced and led the development of a novel CWDM4 proposal for the IEEE 100G Ethernet 802.3bm committee that once acquired highest level of support on the floor (http://www.ieee802.org/3/bm/public/may13/dove_02_0513_optx.pdf). Full baseline proposal (draft clause 96) with all specifications has been prepared for final voting. Although no consensus has been reached by 802.3bm, several MSA were established following the specs of the initial CWDM4 proposal as http://www.cwdm4-msa.org/, https://www.clr4-alliance.org/ and http://www.openopticsmsa.org/.

- http://www.ieee802.org/3/bm/public/jul13/zheng_01a_0713_optx.pdf
- http://www.ieee802.org/3/bm/public/may13/vlasov_01a_0513_optx.pdf
- http://www.ieee802.org/3/bm/public/jan13/vlasov_01_0113_optx.pdf
- http://www.ieee802.org/3/bm/public/smfadhoc/meetings/jan8_13/vlasov_01a_0113_smf.pdf
- http://www.ieee802.org/3/bm/public/nov12/vlasov_01_1112_optx.pdf
- http://www.ieee802.org/3/bm/public/nov12/gill_01_1112_optx.pdf
- http://www.ieee802.org/3/100GNGOPTX/public/mar12/plenary/vlasov_01_0312_NG100GOPTX.pdf

BOARD OR ADVISORY COMMITTEE MEMBER

- Nominator, Japan Prize Foundation
- Scientific Advisory Council, Argonne National Laboratory
- Reviewer, NIH "BRAIN" Initiative review panel (2015-current) ZNS1-SRB-G-13, ZNS1-SRB-G-21, ZEB1-OSR-F-M1, ZNS1-SRB-O-01.
- Advisor, NSF Partnership in Research and Education in Materials at the Metamaterials Research (META-PREM). Michigan, Purdue and Cornell universities. (2015)
- Advisor, The Integrative Graduate Education and Research Traineeship (IGERT), Columbia University (20012-2015)
- NSF/DOE Workshop "Electronics, Communication and Information", Washington (2012)
- Reviewer for Dutch National Science Foundation (2010)
- Columbia University, NSF NRSEC Center (2009-2012)
- Reviewer for Israel National Science Foundation (2009-2010)
- University of Washington, NSF Science and Technology Center on Information Technology Research (2008-2009)
- Reviewer for American National Science Foundation (2008-2009)
- NSF Center for Metamaterials, Purdue University, (2006-2008)
- Australian Center for Ultrahigh bandwidth Devices for Optical Systems, University of Sydney (2006-2007)
- NNI Grand Challenges in Nanoelectronics, Committee on Nanophotonics, Arlington, (2004)
- DARPA Defense Sciences Research Council, "Beyond OEO bottleneck" Arlington, (2003)
- DARPA Workshop "University Based Photonics Research" Arlington (2003)

EDITOR

- IEEE Journal of Selected Topics on Quantum Electronics; Feature Issue on "Enabling technologies for digital optical communication systems" (2010)
- Optics Express; Feature Issue on Photonic Crystals and Holey Fibers (2004)

IX. CORPORATE ANNOUNCEMENTS AND PRESS RELEASES

- **GlobalFoundries March 14, 2018** Extends Silicon Photonics Roadmap to Meet Explosive Demand for Datacenter Connectivity https://www.globalfoundries.com/news-events/press-releases/globalfoundries-extends-silicon-photonics-roadmap-meet-explosive-demand
- **IBM 12 May 2015**: The team at IBM has designed and tested the world's first fully integrated wavelength multiplexed silicon photonics chip that will very soon enable the manufacturing of 100 Gb/s optical transceivers. http://www-03.ibm.com/press/us/en/pressrelease/46839.wss
- **IBM 12 March 2014**: Presentation at the OSA Executive Form, Optical Fiber Communications Conference. IBM is adding to its semiconductor portfolio a CMOS Integrated Silicon Photonics technology which can support the design of electronics and optics on the same chip. http://researcher.watson.ibm.com/researcher/files/us-yvlasov/Vlasov_OFC_ExecForum_03012014.pdf
- **IBM 10 Dec 2012:** IBM announced today a breakthrough technology – called "silicon nanophotonics" – that allows the integration of different optical components side-by-side with electrical circuits on a single silicon chip using, for the first time, sub-100nm semiconductor technology. http://www-03.ibm.com/press/us/en/pressrelease/39641.wss
- **IBM 03 Mar 2010** IBM Scientists Create Ultra-Fast Device Which Uses Light for Communication between Computer Chips. Ultra-Low Power Device Could Greatly Further Energy Efficient Computing

http://www-03.ibm.com/press/us/en/pressrelease/29595.wss

- **IBM 17 Mar 2008 I**BM Researchers Develop World's Tiniest Nanophotonic Switch to route optical data between cores in future computer chips. Nanophotonic switch device for routing light on a chip scale http://www-03.ibm.com/press/us/en/pressrelease/23700.wss
- **IBM 06 Dec 2007** New IBM Research Technology Could Enable Today's Massive Supercomputers to be Tomorrow's Tiny Computer Chips (Advancement in using light instead of wires for building supercomputers-on-a-chip) http://www-03.ibm.com/press/us/en/pressrelease/22769.wss
- **IBM 22 Dec 2006** IBM Milestone Demonstrates Optical Device to Advance Computer Performance http://www-03.ibm.com/press/us/en/pressrelease/20815.wss
- **IBM 03 Nov 2005** IBM Scientists Harness ``Slow Light'' for Optical Communications, http://www-03.ibm.com/press/us/en/pressrelease/7956.wss
- **NEC 03 Nov 2001** Researchers at the NEC Research Institute (NECI) and Princeton University have demonstrated a simple and inexpensive process to obtain these materials, which are needed to create the next generation of photonic devices for telecommunication and computing. http://www.nec.co.jp/press/en/0111/1503.html

X. MAJOR ACCOMPLISHMENTS

2013-2016 *NEURAL CODING IN NEOCORTEX SOMATOSENSORY COLUMNS*

With the completion of a transfer of the IBM Nanophotonics program to Manufacturing I decided to return to my scientific roots. For my accomplishments, I was given a privilege to have a fully paid year off on a sabbatical leave that I decided to use to learn the frontier edge of experimental systems neuroscience. I spent this year at the HHMI Janelia Research Campus working in Karel Svoboda group. This strenuous training boot camp resulted in a co-first-author publication, that I am proudly considering as my neuroscience "graduation diploma". Observation of a family of neurons tuning curves with sharply peaked or suppressed responses tuned to specific distance and their laminar differentiation allows to explore mechanisms of hierarchical sensory information processing in a mammalian cortex. Lately, after returning back to IBM, I was tasked with organizing a new department at IBM Research on Brain-Inspired Technologies. I recruited neuroscientists, computer engineers and device developers and provided a vision and secured financial support for this effort.

Representative publications:

- ✓ N.Sofroniew, Y.Vlasov, S. Hires, J.Freeman, K.Svoboda (2015), "Neural coding in barrel cortex during whisker-guided locomotion", **eLife**;4:e12559 (2015)
- ✓ T Gokmen, Y Vlasov, "Acceleration of deep neural network training with resistive cross-point devices: design considerations", **Frontiers in Neuroscience** 10, 333 (2016)

2005-2015 *COMMERCIALIZATION OF SILICON CMOS-INTEGRATED NANOPHOTONICS TECHNOLOGY*

- **2010-2014** Dr. Vlasov led the transfer and initial qualification of the IBM CMOS-Integrated Nanophotonics technology in the IBM high-volume manufacturing CMOS 200mm foundry in VT. Secured and managed multi-$$M yearly budget and a diverse extended cross-divisional team (>100) targeting the development of technology towards products relevant to IBM Server Division. Developed technology roadmap, performed market/client research, go-to-market strategy, product definition, customer engagements, deals negotiations and vendor supply chain development. Engaged in numerous discussions with industrial partners and clients. Contributed to the definition of the next generation IEEE 100GbE 802.3bm Ethernet standards. Developed support of government agencies and secured funding through a series of grants from DARPA, DOE etc. Led the manufacturing feasibility demonstration of the technology through a series of internal (CEO Milestone) and external demonstrations. Technology availability has been announced in the IBM press release in December 2012, in Dr.Vlasov' presentation at the OFC Executive Forum on March 10, 2014 and IBM press-release on May 8, 2015.
- **2005-2013** Served as a Science and Technology Strategist for the company-wide effort in Nanophotonics. Led formulation of the IBM roadmap on Nanophotonics. Developed detailed plan for implementing the technology for IBM System and Technology Group product roadmap. Dr. Vlasov job in this area was in keeping extended technical research team across technology, materials, packaging, software, etc. development in IBM R&D centers in USA, Europe, Japan, and India focused on common agenda interlocked with the IBM development organization. Reported quarterly on plan execution to Senior VP and senior executive management team. The developed strategy was reported to IBM Board of Directors and was included in the Global Technology Outlook (GTO) – a ten year look ahead to technology issues affecting the IBM Corporation and its customers.
- **2008-2012** In a series of internal demos, research papers, and conference presentations, demonstrated feasibility of various silicon transceivers components exhibiting world-record performance attributes such as monolithic 25Gbps receiver, monolithic 10-channel 250Gbps WDM receiver, integrated 25Gbps modulator and monolithic transmitter, etc. These demonstrations benchmarked the technology readiness to secure business decisions on subsequent product development.

- **2005-2008** Developed the unique IBM CMOS-Integrated Silicon Nanophotonics technology that integrates monolithically both the electrical transistor circuitry and optical circuitry on the same silicon chip at the front-end of a standard CMOS line. Developed a broad portfolio of patents (over 100 issued and pending) covering the processing and packaging technology, as well as device and circuits designs. In 2007-2008 led the manufacturing feasibility demonstration in IBM Yorktown pilot fab line of a monolithically integrated WDM nanophotonics transceiver with highest integration density exceeding 4Tbps/cm^2. The results were publicly announced in the IBM press release on December 2010.

Representative publications:

- ✓ "A 90nm CMOS Integrated Nano-Photonics Technology for 25Gbps WDM Optical Communications Applications", S. Assefa, S. Shank, W. Green, M. Khater, E. Kiewra, C. Reinholm, S. Kamlapurkar, A. Rylyakov, C. Schow, F. Horst, H. Pan, T. Topuria, P. Rice, D. M. Gill, J. Rosenberg, T. Barwicz, M. Yang, J. Poesel, J. Hofrichter, B. Offrein, X. Gu, W. Haensch, J. Ellis-Monaghan, and Y. Vlasov, IEEE International Electron Devices Meeting, postdeadline session 33.8, IEDM Digest (2012) http://researcher.watson.ibm.com/researcher/files/us-yvlasov/assefa_IEDM_final.pdf

2005-2010 *DEVELOPMENT OF SILICON NANOPHOTONICS DEVICES*

This development was inspired by Dr. Vlasov' vision of an on-chip optical interconnects in a new generation of processor chips for power-efficient supercomputers with performance at the Exaflop level. A complete nanophotonics library has been developed that includes ultra-compact active and passive silicon nanophotonics devices, such as modulators, multiplexers/demultiplexers, photodetectors, fiber couplers, etc., that are all scaled down to the diffraction limit – the smallest size that dielectric optics can afford. Dr. Vlasov' group showed several major benchmark demonstrations that allowed to conclude that deeply scaled ultra-dense optical integrated circuits in silicon appear feasible. Development of the "nanophotonics toolkit" allowed to built first nanophotonics integrated circuits that utilize interesting novel optical phenomena.

- **2010** Demonstration of a mid-IR parametric amplifier using silicon nanophotonics waveguides (over **300** citations)
- **2009** Demonstration of a nanoscale germanium photodetector with world-record performance attributes including fast 40GHz operation at CMOS-compatible bias voltages (over **400** citations)
- **2008** Demonstration of a world-smallest high-throughput broadband nanophotonics switch (over **500** citations)
- **2007** Demonstration of a low-power ultra-compact silicon modulator (over **750** citations)
- **2006** Demonstration of a silicon all-optical delay line with hundreds of coupled ring resonators (over **1100** citations)
- **2004-2006** Demonstration of giant enhancement of optical nonlinearities in silicon nanophotonics waveguides including Raman gain, FWM, SPM, XPM, etc. (over **1300** cumulative citations)
- **2003** Demonstration of record-low loss in silicon nanophotonics circuits (over **900** citations)

Representative publications:

- ✓ Reinventing germanium avalanche photodetector for nanophotonic on-chip optical interconnects, S. Assefa, F. Xia, Y.A. Vlasov, Nature 464(7285), 80-84, (2010)
- ✓ Mid-infrared optical parametric amplifier using silicon nanophotonic waveguides, X Liu, RM Osgood, YA Vlasov, WMJ Green, Nature Photonics 4 (8), 557-560 (2010)

2001-2005 *FUNDAMENTAL SCIENCE OF 2D SILICON PHOTONIC CRYSTAL WAVEGUIDES*

Dr. Vlasov was hired at IBM Research in 2001 to initiate and develop a world-class research project on silicon nanophotonics. The major objective was to explore the limits of scaling of photonic components based on silicon-on-insulator nanophotonic waveguides. Starting from development of precise fabrication methods and exploring the fundamental physics of 2D photonic crystals this development led to a demonstration of the first photonic-crystal based integrated circuit that allow to explore very unusual optical phenomena like ultra-slow light propagation velocity.

- **2005** Observation of extremely slow group velocity in the silicon photonic crystal waveguides (over **1300** citations).
- **2001-2004** Invention of an efficient scheme to place electrical contacts to the PhC waveguides allows to demonstrate active manipulation of the group velocity in a nanophotonics circuit by electrical current. First studies of photonic surface states in 2D photonic crystal waveguides led to invention of a coupling scheme based on the idea of photonic resonant tunneling. Careful design of photonic crystal waveguide interface allows to tune surface states in resonance with the slow light mode in PhC and to offset coupling losses resulting from large impedance mismatch. Detailed mapping of the observed spectral features to the photonic band structure for various structural parameters. (over **1200** cumulative citations)
- **2003** Demonstration of record low loss 2D photonic crystal waveguides (over **750** citations)

Representative publications:

- ✓ Active control of slow light on a chip with photonic crystal waveguides, YA Vlasov, M O'Boyle, HF Hamann, SJ McNab, Nature 438 (7064), 65-69, 2005
- ✓ Ultracompact optical buffers on a silicon chip, F Xia, L Sekaric, Y Vlasov, Nature Photonics 1 (1), 65-71, 2006
- ✓ Losses in single-mode silicon-on-insulator strip waveguides and bends, Y Vlasov, S McNab, Optics express 12 (8), 1622-1631, 2004
- ✓ Ultra-low loss photonic integrated circuit with membrane-type photonic crystal waveguides, S McNab, N Moll, Y Vlasov, Optics Express 11 (22), 2927-2939

1998-2001 ***DEMONSTRATION OF A 3D PHOTONIC BAND GAP AT OPTICAL FREQUENCIES***

During Dr. Vlasov' tenure at the NEC Research Institute (Princeton) the main objective was to find a way for chemical synthesis of a 3D photonic crystal with dielectric contrast high enough to exhibit full omni-directional photonic band gap at optical frequencies. This development was pursued through a series of demonstrations of various interesting photonic band gap materials like semiconductor quantum dot photonic crystal, nonlinear conjugated polymer photonic crystal, and a series of novel experimental techniques developed to assess the density of photonic states in the photonic band gap. It is culminated in 2001 with the world-first unambiguous demonstration of a complete photonic band gap in self-assembled silicon 3D photonic band gap crystals at optical frequencies.

- **2001** Demonstration of a full omni-directional photonic band gap in 3D silicon self-assembled photonic crystals (over **1850** citations)
- **1998-1999** Demonstration of chemical methods for synthesis of highly-nonlinear photonic crystals made of conjugated polymers, semiconductor quantum dots, etc. for a new type of ultra-fast photonic switch. (over **1300** cumulative citations)

Representative publications:

- ✓ On-chip natural assembly of silicon photonic bandgap crystals, YA Vlasov, XZ Bo, JC Sturm, DJ Norris, Nature 414 (6861), 289-293, (2001)
- ✓ Chemical Approaches to Three-Dimensional Semiconductor Photonic Crystals, DJ Norris, YA Vlasov, Advanced Materials 13 (6), 371-376, (2001)

1994-1999 ***OPTICAL PHENOMENA IN SELF-ASSEMBLED 3D PHOTONIC CRYSTALS***

After defending Ph.D. in 1994, Dr. Vlasov started independently exploring optics of self-assembled opal photonic crystals at the Ioffe Institute of Physics and Technology, Russia. In 1994-1995 he discovered that self-assembled synthetic opals could be considered as 3D photonic crystals. The pioneering paper describing these results was published in the summer of 1995 opening the new field of self-assembled 3D photonic crystals. This major discovery allowed experiments in photonic band gap materials to be extended into the visible region of spectrum. Over the next couple of years Dr. Vlasov performed a number of novel optical experiments probing the basic properties of synthetic opals. For example, while in Strasbourg, he demonstrated optically pumped photonic band edge lasing in opals filled with a semiconductor. The lasing occurs due to strong modification of the material dispersion at the edges of a photonic gap, which results in significant slowing down of the group velocity and, correspondingly, an increase of the gain coefficient. This slow light effect was also for the first time probed directly by measuring the delay of femtosecond optical pulses passing through a photonic crystal.

- **1999** First demonstration of slow group velocity at the edges of a photonic gap in photonic crystals (precedes follow-up papers on slow light phenomena by at least **a year**)
- **1998-1999** Prediction on the feasibility of achieving the omni-directional photonic band gap in synthetic opals with inverted refractive index. Experimental studies of intrinsic crystal defects and light localization in the vicinity of photonic band gap (over **800** cumulative citations)
- **1997** First demonstration of gain enhancement and lasing in photonic crystal with quantum dots (precedes follow-up papers on photonic crystal lasers by at least **a year**)
- **1995** Discovery of photonic band gap effects in self-assembled synthetic opal photonic crystals. The pioneering paper (Nuovo Cimento, 1995) and a book chapter (HOLSOS, 1995), in which for the first-time optical properties of opals were described in terms of photonic bands and gaps. These publications precede numerous publications of other groups on the same topic by **at least 2 years**. Despite being published in a relatively obscure journal it has collected over **300** citations.

Representative publications:

- ✓ Manifestation of intrinsic defects in optical properties of self-organized opal photonic crystals, YA Vlasov, VN Astratov, AV Baryshev, AA Kaplyanskii, OZ Karimov, Physical Review E 61 (5), 5784 (2000)
- ✓ Existence of a photonic pseudogap for visible light in synthetic opals, YA Vlasov, VN Astratov, OZ Karimov, AA Kaplyanskii, VN Bogomolov, Physical Review B 55 (20), R13357 (1997)
- ✓ Optical spectroscopy of opal matrices with CdS embedded in its pores: Quantum confinement and photonic band gap effects, VN Astratov, VN Bogomolov, AA Kaplyanskii, AV Prokofiev, Il Nuovo Cimento D 17 (11-12), 1349-1354 (1995)

XI. FULL LIST OF PUBLICATIONS

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II. CONFERENCE PRESENTATIONS

INVITED, KEYNOTE, TUTORIAL, and PLENARY TALKS

[1]. **Plenary Group IV Photonics,** On Neurophotonics – A Report from a Journey of a Photonics Engineer into Neuromorphic Computing and Neurobiology, Y.Vlasov, Group IV Photonics (GFP), 2018 IEEE 15th International Conference on

[2]. **Plenary Group IV Photonics,** Enabling large-scale deployment of photonics through cost-efficient and scalable packaging, Tymon Barwicz, Yoichi Taira, Ted W Lichoulas, Nicolas Boyer, Hidetoshi Numata, Yves Martin, Jae-Woong Nah, Shotaro Takenobu, Alexander Janta-Polczynski, Eddie L Kimbrell, Robert Leidy, Marwan Khater, Swetha Kamlapurkar, Sebastian Engelmann, Yurii A Vlasov, Paul Fortier, Group IV Photonics (GFP), 2015 IEEE 12th International Conference on, 155-156

[3]. **Invited,** Automated, self-aligned assembly of 12 fibers per nanophotonic chip with standard microelectronics assembly tooling, Tymon Barwicz, Nicolas Boyer, Stephane Harel, Ted W Lichoulas, Eddie L Kimbrell, Alexander Janta-Polczynski, Swetha Kamlapurkar, Sebastian Engelmann, Yurii A Vlasov, Paul Fortier, Electronic Components and Technology Conference (ECTC), IEEE 65th, 775-782 (2015)

[4]. **Plenary, SPIE Photonics West "**Silicon Integrated Nanophotonics: From Fundamental Science to Manufacturable Technology**"**, February 2015. Video at http://spie.org/x112677.xml

[5]. **Invited,** Jason Orcutt, John Ellis-Monaghan, Steve Shank, Marwan Khater, Ed Kiewra, Solomon Assefa, Frederick G Anderson, Jonathan E Proesel, Andreas Stricker, Mounir Meghelli, Yurii A Vlasov, Will Green, Wilfried Haensch, "CMOS Integrated Ge Detectors", Frontiers in Optics, FM3A. 3 (2014)

[6]. **invited** "IBM CMOS Nanophotonics Technology", Y. Vlasov, IV International Symposium on Photonics and Electronics Convergence -Advanced Nanophotonics and Silicon Device Systems, Tokyo, November 2014

[7]. **invited, "**Integrated Nanophotonics Technology for Optical Interconnects", Frontiers in Optics, Tucson, AZ October 2014

[8]. **invited, "**CMOS-integrated Ge photodetectors", Frontiers in Optics, Tucson, AZ October 2014

[9]. **Plenary**, **OSA Optics and Photonics Congress** "Applications of Integrated Photonics Technology - From Optical Interconnects to Neurophotonics", July 2014, San Diego,

[10]. **Executive Forum**, **Optical Fiber Communications** March 10, 2014

[11]. **invited** Breaking the conventional limitations of microrings. J. K. S. Poon, W. D. Sacher, J. C. Mikkelsen, S. Assefa, D. Gill, T. Barwicz, H. Pan, S. Shank, Y. A. Vlasov, W. M. J. Green. CLEO 2014. Paper SM3G.1

[12]. **Keynote, Silicon Photonics Forum,** "IBM CMOS Nanophotonics Technology", Y. Vlasov, Taiwan, November 2013

[13]. **invited** "IBM CMOS Nanophotonics Technology", Y. Vlasov, III International Symposium on Photonics and Electronics Convergence -Advanced Nanophotonics and Silicon Device Systems, Tokyo, November 2013

[14]. **Keynote Address**, Microphotonics Center Industry Consortium Meeting, October 2013, MIT

[15]. **invited** High-speed modulation of optical microcavities; W. D. Sacher, W. M. J. Green, S. Assefa, T. Barwicz, H. Pan, S. M. Shank, Y. A. Vlasov, J. K. S. Poon. SPIE Photonics West, 2013. LASE-Paper 8600-19.

[16]. **Tutorial**, **CLEO/QELS** "Integrated Silicon Nanophotonics for high-bandwidth chip-to-chip communications", Y. Vlasov, 2013

[17]. **invited** "IBM CMOS Nanophotonics Technology", Y. Vlasov, II International Symposium on Photonics and Electronics Convergence -Advanced Nanophotonics and Silicon Device Systems, Tokyo, 2012

[18]. **Plenary CLEO/QELS** "Silicon Integrated Nanophotonics: Road from Scientific Explorations to Practical Applications", Y .Vlasov, 2012 Video at https://www.youtube.com/watch?v=9Vh_WFwzS_4&nohtml5=False

[19]. **invited** "The Latest Trends in Silicon Photonics", Y. Vlasov, 12th Fiber Optics Expo, Tokyo 2012

[20]. **invited** International Workshop "Novel Ideas in Optics: From Advanced Materials to Revolutionary Applications" May 31-June 2, 2012, Purdue University, West Lafayette, IN, USA
[21]. **invited** Nonlinear silicon nanophotonics for mid-infrared application, W.M.J. Green, X. Liu, B. Kuyken, R.M. Osgood Jr, G. Roelkens, R. Baets, Y.A. Vlasov, IEEE ICO International Conference on Information Photonics (IP), 2011
[22]. **invited** "Key application and Si photonics for computation", Y. Vlasov, International JSPS School on Silicon Photonics, Kyoto, 2011
[23]. **Plenary IEEE Bipolar/BiCMOS Circuits and Technology Meeting (BCTM)** "CMOS Integrated Nanophotonics for Future Computing Systems", Y.A. Vlasov, , 2011
[24]. **Plenary International Conference on Theoretical and Computational Nanophotonics**, October 26-28, Bonn, 2011
[25]. **invited** "IBM CMOS Nanophotonics Technology for Future Exascale Computing Systems", Y. Vlasov, International Symposium on Photonics and Electronics Convergence -Advanced Nanophotonics and Silicon Device Systems, Tokyo, 2011
[26]. **invited** "WDM Filters For Silicon Photonics Transceivers", F. Horst, W.M.J. Green, S. Assefa, S.M. Shank, B.J. Offrein, Y.A. Vlasov , 16th OptoeElectronics and Communications Conference (OECC), 2011, pp. 842--844
[27]. **invited** "CMOS integrated silicon nanophotonics: An enabling technology for exascale computing", W. Green, S. Assefa, A. Rylyakov, C. Schow, F. Horst, Y. Vlasov , Integrated Photonics Research, Silicon and Nanophotonics, 2011
[28]. **invited** "Monolithic integration of CMOS and nanophotonic devices for massively parallel optical interconnects in supercomputers", S. Assefa, W.M.J. Green, A. Rylyakov, C. Schow, F. Horst, Y.A. Vlasov , Device Research Conference (DRC), 2011 69th Annual, pp. 253--256
[29]. **invited** "Deeply-scaled CMOS-integrated nanophotonic devices for next generation supercomputers", S. Assefa, W.M.J. Green, A. Rylyakov, C. Schow, F. Horst, Y.A. Vlasov, Proceedings of the 21st Great lakes symposium on VLSI, pp. 475--476, 2011
[30]. **invited** Increasing bandwidth density in future optical interconnects, BG Lee, C. Baks, FE Doany, C. Jahnes, R. John, DM Kuchta, P. Pepeljugoski, AV Rylyakov, CL Schow, S. Assefa, others , Photonics Conference (PHO), 2011 IEEE, pp. 670--671
[31]. **invited** "CMOS Integrated Silicon Nanophotonics for Exascale Computing", W.M. Green, S. Assefa, A. Rylyakov, C. Schow, F. Horst, Y. Vlasov , Frontiers in Optics, 2011
[32]. **invited** "Ultra-dense monolithic integration of optical and electrical functions on silicon for optical interconnects", S. Assefa, W.M.J. Green, A. Rylyakov, C. Schow, F. Horst, Y.A. Vlasov , General Assembly and Scientific Symposium, 2011 XXXth URSI, pp. 1--2
[33]. **Plenary, IEEE International SOI Conference (SOI),** "CMOS integrated silicon nanophotonics for future exascale systems", Y.A. Vlasov , 2011
[34]. **invited** "Nonlinear silicon nanophotonics for mid-infrared applications", W.M.J. Green, X. Liu, B. Kuyken, RM Osgood, G. Roelkens, R. Baets, Y.A. Vlasov , Information Photonics (IP), 2011 ICO International Conference on, pp. 1--2
[35]. **invited** "CMOS integrated nanophotonics: Enabling technology for exascale computing systems", S. Assefa, W.M. Green, A. Rylyakov, C. Schow, F. Horst, Y. Vlasov , Optical Fiber Communication Conference, 2011
[36]. **invited** "Si Integrated Nanophotonics for on-chip optical interconnects" Y.A.Vlasov, S. Assefa, W. M. J. Green, M. Yang, C. L. Schow, A. Rylyakov, Optical Fiber Communication Conference , March 2011
[37]. **invited** "Si Integrated Nanophotonics for on-chip optical interconnects" Y.A.Vlasov, S. Assefa, W. M. J. Green, M. Yang, C. L. Schow, A. Rylyakov, SEMI Technology Symposium (STS), Tokyo, December2010
[38]. **invited** "High-Gain Si-Chip Optical Parametric Mixing Beyond Two-Photon Absorption," W. M. J. Green, X. Liu, R. M. Osgood, Jr., and Y. A. Vlasov, IEEE Photonics Society Annual Meeting, November 2010.
[39]. **invited** "Si Integrated Nanophotonics for on-chip optical interconnects" Y.A.Vlasov, S. Assefa, W. M. J. Green, M. Yang, C. L. Schow, A. Rylyakov, European Conference on Optical Communications, Turin, October 2010
[40]. **invited** "Si Integrated Nanophotonics for on-chip optical interconnects" Y.A.Vlasov, S. Assefa, W. M. J. Green, M. Yang, C. L. Schow, A. Rylyakov, IEEE Photonics Society Annual Meeting, Denver, November 2010
[41]. **invited**, "CMOS-compatible Waveguide-integrated Germanium Avalanche Photodetectors," S. Assefa, F. Xia, and Y. A. Vlasov, Electro-Chemical Society, Vegas, October 2010.
[42]. **invited** "CMOS-integrated Germanium Photodetectors," S. Assefa, F. Xia, and Y. A. Vlasov, Group IV photonics, Beijing China, September 2010.
[43]. **invited** "Engineering Silicon Nanophotonic Waveguides for Mid-Infrared Nonlinear Optics," W. M. J. Green, X. Liu, R. M. Osgood, Jr., and Y. A. Vlasov, SIAM Conference on Nonlinear Waves, August 2010.
[44]. **invited** "Germanium Avalanche Photodetectors," S. Assefa, F. Xia, and Y. A. Vlasov, Integrated Photonics Research, Santa Cruz, CA, July 2010
[45]. **invited** "Mid-Infrared Nonlinear Optics in Silicon Photonic Wire Waveguides," W. M. J. Green, X. Liu, R. M. Osgood, Jr., and Y. A. Vlasov, IEEE Photonics Society Summer Topical Meeting, July 2010.

[46]. **invited** "Si Integrated Nanophotonics for on-chip optical interconnects" Y.A.Vlasov, S. Assefa, W. M. J. Green, M. Yang, C. L. Schow, A. Rylyakov, and Y. A. Vlasov, IEICE Si photonics symposium, Tokyo, June 2010

[47]. **invited** "*Broadband Silicon Photonic Switch Integrated with CMOS Drive Electronics*," B. G. Lee, J. Van Campenhout, A. V. Rylyakov, C. L. Schow, W. M. J. Green, S. Assefa, M. Yang, F. E. Doany, C. V. Jahnes, R. A. John, J. A. Kash, and Y. A. Vlasov, Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference, May 2010.

[48]. **invited** "Deeply Scaled Silicon Photonic Devices," S. Assefa, W. Green, F. Xia, and Y. A. Vlasov, Annual Workshop on Interconnection within High speed digital Systems, May, Santa Fe, NM, May 2010.

[49]. **invited** "Silicon Nanophotonics," Y. A. Vlasov, S. Assefa, and F. Xia, Institute of Electronics, Information, and Communication Engineers (IEICE) Conference, Tokyo, Japan, May 2010.

[50]. **invited** "CMOS-Integrated Low-Noise Germanium Waveguide Avalanche Photodetector Operating at 40Gbps," S. Assefa, F. Xia, and Y. A. Vlasov, Optical Fiber Communication Conference (OFC), Paper OWN3, San Diego, CA, March 2010.

[51]. **invited** "Silicon Integrated Waveguide Devices for Filtering and Wavelength Demultiplexing" F. Horst, B. Offrein, S. Assefa, W. Green, Y. Vlasov, Optical Fiber Communication Conference, March 2010.

[52]. **invited** "Combining Si-Photonics and Optical PCB's," F. Horst, B. Offrein, S. Assefa, W. Green, Y. Vlasov, 22nd Annual Lasers and Electro Optics Society Meeting, October 2009.

[53]. **invited** "Simulation, design and implementation of silicon photonics WDM devices for on-chip optical interconnects" F. Horst, W. M. J. Green, B.J. Offrein and Y.A. Vlasov, Photonics North 2009, May 2009.

[54]. **invited** Silicon integrated nanophotonics for on-chip optical interconnects, Y. A. Vlasov, European Conference on Quantum Electronics (EQEC/CLEO) June 2009

[55]. **invited** "Heterogeneous Integration of Materials on Si for Nanophotonics Devices", S. Assefa, F. Xia, W. Green, J. Van Campenhout, T. Topuria, P. Rice, Y. Zhang, S. Bedell, and Y. Vlasov, Annual Meeting of the American Physical Society, Pittsburgh, Pennsylvania, March 2009.

[56]. **invited "**Communication Technologies for Exascale Systems", J. A. Kash, P. Pepeljugoski, F. E. Doany, C. L. Schow, D. M. Kuchta, L. Schares, R. Budd, F. Libsch, R. Dangel, F. Horst, B. J. Offrein, Y. Vlasov, W. M. J. Green, F. Xia, C. W. Baks, Y. H. Kwark, D. G. Kam, and M. B. Ritter, Paper 72210F SPIE Photonics West Conference on Integrated Optoelectronic Devices, San Jose, California, January 2009.

[57]. **invited "**Broadband Ultra-Compact Nanophotonic Optical Modulators and Switches", W. M. J. Green, S. Assefa, J. Van Campenhout, Y.-H. Kim, F. Xia, and Y. A. Vlasov, Paper TuBB1, IEEE LEOS Annual Meeting, Newport Beach, California, November 2008.

[58]. **invited "**Silicon Nanophotonics for future computing systems", Y.A.Vlasov, IEEE Nanotechnology Materials and Devices Conference, Kyoto Japan, October 2008

[59]. **Tutorial "**Silicon Nanophotonics for future computing systems", Y.A.Vlasov, European conference for Optical Communications, Brussels, September 2008

[60]. **invited "**Silicon integrated nanophotonics for on-chip optical interconnects", Y.A.Vlasov, W. M. J. Green, S. Assefa, J. Van Campenhout, Y.-H. Kim, F. Xia, Group Four Photonics, Sorrento, September 2008

[61]. **invited** "Nonlinear optics in Si wires on an SOI platform", R. Osgood, Chen, O. ; Hsieh, A. ; Dadap, J. ; Panoiu, N. ; Xiaoping Liu ; Green, W. ; Vlasov, Y., Group Four Photonics, Sorrento, September 2008

[62]. **invited** "Silicon Integrated Nanophotonics: A Platform for On-Chip Optical Interconnects," W. M. J. Green, S. Assefa, J. Van Campenhout, Y.-H. Kim, F. Xia, and Y. A. Vlasov, Paper E-7-1, International Conference on Solid State Devices and Materials, Tsukuba, Japan, September 2008.

[63]. **invited** "Silicon Photonics at IBM," F. Horst, W. M. J. Green, B.J. Offrein and Y.A. Vlasov, IEEE-LEOS Benelux Meeting, October 2008.

[64]. **invited** "Slow Light in Photonic Crystal Waveguides and Cavities," S. Assefa, W. M. J. Green, F. Xia, and Y.Vlasov, Paper SWB2 invited, Integrated Photonics and Nanophotonics Research and Applications, Boston, Massachusetts, July 2008.

[65]. **invited,** "Ultra-Compact Silicon Modulators and Switches for On-Chip Optical Networks," W. M. J. Green, F. Xia, S. Assefa, J. Van Campenhout, and Yurii Vlasov, Paper TuB4 invited, IEEE LEOS Workshop on Interconnects within High Speed Digital Systems, Santa Fe, New Mexico, May 2008.

[66]. **invited** "Silicon Micro-Resonators for On-Chip Optical Networks," Y. A. Vlasov, F. Xia, S. Assefa, and W. M. J. Green, Paper JMC1, Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference, San Jose, California, May 2008.

[67]. **invited** "Silicon Nanophotonics for on-chip interconnects" Y.A.Vlasov, American Physical Society Meeting, March 2008

[68]. **invited** "High-Throughput Silicon Nanophotonic Deflection Switch for On-Chip Optical Networks," Y. Vlasov, W. M. J. Green, and F. Xia, Paper OTuF5, Optical Fiber Communication Conference, San Diego, California, February 2008.

[69]. **invited,** "Efficient Coupling into Photonic Crystal Cavities and Waveguides," S. Assefa, W. M. J. Green, F. Xia, and Y.Vlasov, Paper HL5.2 invited, German Physical Society Annual Meeting, Berlin, Germany, February 2008.

[70]. **invited,** "Silicon Photonic Wire Circuits for On-Chip Optical Interconnects," W. M. J. Green, F. Xia, S. Assefa, M. J. Rooks, L. Sekaric, and Y. A. Vlasov, Paper 6883-05 invited, SPIE Photonics West Conference on Advanced Fabrication Technologies for Micro/Nano Optics and Photonics, San Jose, California, January 2008.

[71]. **invited,** "Efficient Coupling Via Mode Matching in Photonic Crystal Waveguides and Cavities," S. Assefa, W. M. J. Green, F. Xia, and Y. A. Vlasov,Paper 6901-42 invited, SPIE Photonics West Conference on Photonic Crystal Materials and Devices VII, San Jose, California, January 2008.

[72]. **invited,** , "Fiber on a Chip: Nonlinear Optics for Data Communication via Silicon Photonic Wires," R. M. Osgood, Jr., X. Chen, I. Hsieh, J. I. Dadap, Jr., N. C. Panoiu, W. M. J. Green, Y. A. Vlasov Paper 6898-24 , SPIE Photonics West Conference on Optoelectronic Integrated Circuits X, San Jose, California, January 2008

[73]. **invited** "Silicon integrated Nanophotonics for on-chip optical interconnects", Y.Vlasov, F. Xia, L. Sekaric, W. Green, Solomon Assefa, M.Rooks, Workshop on "Frontiers in Nanophotonics and Plasmonics", Guarujá, SP Brazil November 10-14, 2007

[74]. **invited** "Silicon integrated Nanophotonics for on-chip optical interconnects", Y.Vlasov, F. Xia, L. Sekaric, W. Green, Solomon Assefa, M.Rooks, Annual Meeting of Laser and Electro-Optic Society LEOS, Orlando, FL, October 25-27, 2007

[75]. **invited** "Ultra-compact optical buffers on a silicon chip" Y.Vlasov, Fengnian Xia, Lidija Sekaric, William Green, Solomon Assefa, Michael Rooks, Sharee McNab, European Conference on Optical communications ECOC, Berlin, September 16 - 20, 2007

[76]. **invited** "Resonantly enhanced all optical buffers on a silicon chip", F. Xia, L. Sekaric, Yu. Vlasov, 2007, IEEE LEOS Photonics in Switching, San Francisco, August 19-22

[77]. **3 invited lectures** 44th International School on Quantum Electronics, "Advances in Nanophotonics III", Erice, Sicily, June 22 - July 2, 2007
Lecture 1: Silicon Integrated Nanophotonics – Road from Theory to Practice
Lecture 2: Road Back - from Practice to Theory
Lecture 3: Nano-photonic devices for on-chip interconnects

[78]. **invited** "Ultra-compact optical switches for on-chip optical interconnects", William M. J. Green, Fengnian Xia, Michael J. Rooks, Lidija Sekaric, Yurii A. Vlasov, Photonics North 2007 Conference, Ottawa, Canada June 4-7, 2007

[79]. **invited** Y.Vlasov, Workshop on "Physics of micro-resonators", Charlotte, NC, June 8-9, 2007

[80]. **invited** Y.Vlasov, Symposium on "Photonic Metamaterials" OSA, June 4-7, 2007, Jackson Hole, WY

[81]. **invited** "Silicon integrated nanophotonics - advantages and challenges", Y.Vlasov, F.Xia, L.Sekaric, E.Dulkeith, S.Assefa, W. Green, M. O'Boyle, H.Hamann and S.J.McNab ,Advanced Materials in Nanotechnology-III, Wellington, New Zealand, February 11-16, 2007

[82]. **invited** "Silicon integrated nanophotonics - advantages and challenges", Y.Vlasov, F.Xia, L.Sekaric, E.Dulkeith, S.Assefa, W. Green, M. O'Boyle, H.Hamann and S.J.McNab, First European Conference on Nano-Meta-materials "NanoMeta 2007", Seefeld, Austria, January 8-11, 2007

[83]. **invited** "Silicon Nanophotonic Materials", F.Xia, M. O'Boyle, E.Dulkeith, L.Sekaric and Yu.A.Vlasov, MRS Fall Meeting, December 4, 2006, Boston,

[84]. **invited** "Optical buffers based on Silicon Integrated Nanophotonics", F.Xia, M. O'Boyle, E.Dulkeith, L.Sekaric and Yu.A. Vlasov, OSA Annual, October 22-24, 2006, Rochester

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[181]. **Post-deadline** B. G. Lee, F. E. Doany, S. Assefa, W. M. J. Green, M. Yang, C. L. Schow, C. V. Jahnes, S. Zhang, J. Singer, V. I. Kopp, J. A. Kash, and Y. A. Vlasov, *"20-um-Pitch Eight-Channel Monolithic Fiber Array Coupling 160 Gb/s/Channel to Silicon Nanophotonic Chip,"* , Optical Fiber Communication Conference, March 2010.

[182]. **Post-deadline** Michael L. Cooper, Greeshma Gupta, William M. J. Green, Solomon Assefa, Fengnian Xia, Yurii A. Vlasov and Shayan Mookherjea, "Disorder-screened optical delay in large-scale silicon microring CROWs," Conference on Lasers and Elecro-optics (CLEO), 2010

[183]. Christopher Kang, Christopher Phare, and Sharon M. Weiss, Y. A. Vlasov, and S. Assefa, "Photonic Crystal Defects with Increased Surface Area for Improved Refractive Index Sensing," Conference on Lasers and Elecro-optics (CLEO), 2010.

[184]. Michael L. Cooper, Greeshma Gupta, William M. J. Green, Solomon Assefa, Fengnian Xia, Yurii A. Vlasov and Shayan Mookherjea, "235-ring Coupled-Resonator Optical Waveguides," Conference on Lasers and Elecro-optics (CLEO), 2010.

[185]. Jie Gao, Felice Gesuele, Weon-kyu Koh, Christopher Murray, Solomon Assefa, and Chee Wei Wong, "Weak exciton-photon coupling of PbS nanocrystals in an air-slot mode-gap Si photonic crystal nanocavities in the near-infrared," Conference on Lasers and Elecro-optics (CLEO), 2010.

[186]. S. Assefa, F. Xia, and Y. A. Vlasov, "Waveguide-Integrated Low-Noise Germanium Avalanche Photodetector with 6dB Sensitivity Improvement," Conference on Lasers and Elecro-optics (CLEO), 2010.

[187]. **Post-deadline,** X. Liu, R. M. Osgood, Jr., Y. A. Vlasov, and W. M. J. Green, "*Broadband Mid-Infrared Parametric Amplification, Net Off-Chip Gain, and Cascaded Four-Wave Mixing in Silicon Photonic Wires,*" Paper PD 1.3 IEEE Photonics Society International Conference on Group IV Photonics, San Francisco, California, September 2009.

[188]. J. Van Campenhout, W. M. J. Green and Y. A. Vlasov, *"Broadband Digital Optical Switches Based on a SOI Mach-Zehnder Lattice,"* Paper TuDD2, IEEE LEOS Annual Meeting, Newport Beach, California, November 2008.

[189]. X. Liu, W. M. J. Green, I.-W. Hsieh, J. I. Dadap, Y. A. Vlasov, and R. M. Osgood, Jr., "*Dispersion Engineering in Silicon Photonic Wires Using Thin Si_3N_4 Conformal Dielectric Coating,*" Paper IMC7, Integrated Photonics and Nanophotonics Research and Applications, Boston, Massachusetts, July 2008.

[190]. W. M. J. Green, X. Liu, X. Chen, S. Assefa, R. M. Osgood, Jr., and Y. A. Vlasov, "*Dispersion Engineering of Silicon Nanophotonic Wires Using a Thin Film Cladding,*" Paper CTuDD5, Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference, San Jose, California, May 2008.

[191]. S. Assefa, W. M. J. Green, F. Xia, and Yu. A. Vlasov, "*Coupling into Slow Light in Photonic Crystal Waveguides,*" Paper QThJ1, Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference, San Jose, California, May 2008.

[192]. F. Horst, W. M. J. Green, B. J. Offrein, and Y. Vlasov, "Echelle *Grating WDM (De-) Multiplexers in SOI Technology Based on a Design with Two Stigmatic Points,*" Paper 6996-26, SPIE Photonics Europe Conference on Silicon Photonics and Photonic Integrated Circuits, Strasbourg, France, April 2008.

[193]. **Best paper award** On-chip photonic communication for high-performance multi-core processors, K. Bergman, L.P. Carloni, JA Kash, Y. Vlasov, Eleventh Annual Workshop on High Performance Embedded Computing, Lexington, MA, pp. 18--20, 2007

[194]. **Post-deadline** "Ultra-compact, low RF power, 10 Gb/s silicon Mach-Zehnder modulator" William M. J. Green, Michael J. Rooks, Lidija Sekaric, and Yurii A. Vlasov, Annual Meeting of Laser and Electro-Optic Society LEOS, Orlando, FL, October 25-27, 2007

[195]. "Ultrahigh-Bandwidth WDM Signal Integrity in Silicon-on-Insulator Nanowire Waveguides" Benjamin G. Lee, Xiaogang Chen, Aleksandr Biberman, Xiaoping Liu, I-Wei Hsieh, Cheng-Yun Chou, Jerry Dadap, Richard M. Osgood, Jr., and Keren Bergman, Fengnian Xia, William Green, Lidija Sekaric, and Yurii Vlasov, Annual Meeting of Laser and Electro-Optic Society LEOS, Orlando, FL, October 25-27 , 2007

[196]. "Demonstration of 300 Gbps Error-Free Transmission of WDM Data Stream in Silicon Photonic Wires", X. Chen, B. G. Lee, X. Liu, B. A. Small, I. Hsieh, J. Dadap, K.Bergman R. M. Osgood, Jr., F. Xia, W.Green, L. Sekaric, Y. Vlasov, International Conference CLEO/QELS, Baltimore, MD May 6-11, 2007

[197]. "Ultra-compact silicon WDM optical filters with flat –top response for on-chip optical interconnects", F. Xia, M. Rooks, L. Sekaric, and Y.Vlasov, International Conference CLEO/QELS, Baltimore, MD May 6-11, 2007

[198]. "Determination of Third-Order Dispersion Coefficient and Observation of Soliton Radiation in Si Wire-Waveguides", I. Hsieh, X. Chen, J. I. Dadap, N. C. Panoiu, R. M. Osgood, Jr., S. J. McNab and Y. A. Vlasov, International Conference CLEO/QELS, Baltimore, MD, May 6-11, 2007

[199]. "Silicon modulator based on anti-crossing between paired amplitude and phase tunable microring resonators". W. M. J. Green, M. Rooks, L. Sekaric, and Y. A. Vlasov, International Conference CLEO/QELS, Baltimore, MD May 6-11 , 2007

[200]. "Coupling into slow light regime of photonic crystal waveguide by tapering local group index", F. Xia, L. Sekaric, and Yu. Vlasov, VII International conference on Photonic and Electromagnetic Crystal structures, PECSVII, Monterey, CA April 8-11, 2007

[201]. "Lumped photonic crystal elements interfaced to photonic wire circuits", W. M. J. Green, S. Assefa, F. Xia, L. Sekaric, Y. A. Vlasov, VII International conference on Photonic and Electromagnetic Crystal structures, PECSVII, Monterey, CA April 8-11, 2007

[202]. "High Order Dispersion in Photonic Crystal Waveguides", Solomon Assefa, Sharee J. McNab, and Yurii A. Vlasov, VII International conference on Photonic and Electromagnetic Crystal structures, PECSVII, Monterey, CA April 8-11, 2007

[203]. "Ultra-compact reconfigurable silicon optical devices using micron-scale localized thermal heating", W. M. J. Green, H. F. Hamann, L. Sekaric, M. J. Rooks, and Y. A. Vlasov, Optical Fiber Communications, Annaheim, CA, March 25-29, 2007

[204]. "Ultra-compact wavelength division multiplexing devices using silicon photonic wires for on-chip interconnects", F. Xia, M. O'Boyle, L. Sekaric and Y. A. Vlasov, Optical Fiber Comunications, Annaheim, CA, March 25-29, 2007

[205]. "Cross-Phase Modulation in Silicon Photonic Wire Waveguides", I.-W. Hsieh, X.-G. Chen, J. I. Dadap, N. C. Panoiu, R. M. Osgood, Jr., S. J. McNab, Y. A. Vlasov, CLEO/QELS, May 22-27, 2006, Long Beach

[206]. "Mode conversion losses in SOI photonic wire based racetrack resonators", Fengnian Xia, Lidija Sekaric and Yurii A. Vlasov, CLEO/QELS, May 22-27, 2006, Long Beach

[207]. "Efficient self-phase modulation in submicron silicon-on-insulator waveguides" E. Dulkeith, F. Xia, and Y.Vlasov, X. Chen, N. C. Panoiu, and R. Osgood CLEO/QELS, May 22-27, 2006, Long Beach

[208]. "Compact wavelength multiplexers/demultiplexers using photonic wires on silicon-on-insulator (SOI) substrate", Fengnian Xia, Martin O'Boyle, Lidija Sekaric and Yurii A. Vlasov, LEOS Symposium on Indium Phosphide and Related Materials IPRM, Princeton, May 2006.

[209]. "Experimental mapping of the photonic band structure in SOI photonic crystal waveguides", E.Dulkeith, S.J.McNab, Y.A.Vlasov, OSA Annual, Tucson, Oct. 16-20, 2005

[210]. **first poster award** "Photonic crystal waveguide bends for slow light", S.Assefa, S.J.McNab, Y.A.Vlasov, VI Symposium on Photonic and Electromagnetic Crystal Structures, Crete, June 19-24,2005

[211]. "Experimental mapping of the photonic band structure in SOI photonic crystal waveguides", E.Dulkeith, S.J.McNab, Y.A.Vlasov, VI Symposium on Photonic and Electromagnetic Crystal Structures, Crete, June 19-24,2005

[212]. "Y-splitters in photonic wires and photonic crystal waveguides", L.Sekaric, S.J.McNab, Y.A.Vlasov, VI Symposium on Photonic and Electromagnetic Crystal Structures, Crete, June 19-24,2005

[213]. "Coupling into the photonic crystal waveguides in the slow light regime", Y.A. Vlasov, S.J.McNab, VI Symposium on Photonic and Electromagnetic Crystal Structures, Crete, June 19-24,2005

[214]. "Novel application of photonic crystals - Optical Isolation for Electrical Contacts", S.J.McNab, M. O'Boyle, H.Hamann and Y.A.Vlasov, VI Symposium on Photonic and Electromagnetic Crystal Structures, Crete, June 19-24,2005

[215]. "Experimental mapping of the photonic band structure in SOI photonic crystal waveguides", E.Dulkeith, S.J.McNab, Y.A.Vlasov, CLEO/QELS, Baltimore, May 22-27, 2005

[216]. **Post-deadline** "Bending light with photonic crystals", S. Assefa, S. J. McNab, and Yu. Vlasov, OSA Topical Meeting "Nanophotonics for Information Systems", San Diego, April 13-15, 2005

[217]. "Bending light with photonic crystals", S. J. McNab, N. Moll and Yu. Vlasov, Advance Materials in Nanotechnology, Canterbury, New Zealand, February 2005

[218]. "Waveguiding in asymmetric double-trench photonic crystals" Y.Vlasov, N.Moll, S.J.McNab, CLEO/QELS, San Francisco, May 16-21, 2004

[219]. "Intrinsic diffraction losses in 2D SOI photonic crystal waveguides" Y.Vlasov, N.Moll, S.J.McNab, CLEO/QELS, San Francisco, May 16-21, 2004

[220]. "Intrinsic diffraction losses in 2D SOI photonic crystal waveguides" N.Moll, S.J.McNab, Y.Vlasov, V Symposium on Photonic and Electromagnetic Crystal Structures, Kyoto, March 7-11, 2004

[221]. "Experimental observation of surface states in truncated 2D SOI photonic crystal waveguides", S.J.McNab, N.Moll, Y.Vlasov, V Symposium on Photonic and Electromagnetic Crystal Structures, Kyoto, March 7-11, 2004

[222]. "Waveguiding in asymmetric double-trench photonic crystals". N.Moll, S.J.McNab, Y.Vlasov, V Symposium on Photonic and Electromagnetic Crystal Structures, Kyoto, March 7-11, 2004

[223]. "Mode mixing in asymmetric double-trench photonic crystal waveguides" Yu.A.Vlasov, N. Moll, and S.J.McNab, Optoelectronics 2004, Photonics West, "Photonic Bandgap Materials and Devices", San Jose, CA, 19-25 January 2004

[224]. "Stop-band mediated diffraction" Y.Vlasov. S.Fan, D. Norris, MRS Fall meeting, Boston, December 2002

[225]. "Efficient butt-coupling into the photonic crystal waveguides" Y. Vlasov, S. McNab, N. Moll, MRS Fall Meeting, Boston, December 2002

[226]. "Stop-band mediated diffraction" Y.Vlasov. S.Fan, D. Norris, IV Symposium on Photonic and Electromagnetic Crystal Structures, LA, October 28-31, 2002

[227]. Y.Vlasov and D. J. Norris, "Evolution of the higher order bands in inverted opals" CLEO/QELS, May 2001, Baltimore.
[228]. Y.Vlasov and D. J. Norris, "Evolution of the higher order bands in inverted opals", 221st American Chemical Society National Meeting, April 2001, San Diego, CA
[229]. Y.Vlasov and D. J. Norris "Evolution of the PBG in opals", APS March Meeting, March 12 - 16, 2001,Seattle, Washington
[230]. Y.Vlasov, M. Deutsch, D. J. Norris, "Optical properties of semiconductor quantum dot photonic crystals" Material Research Society Meeting, Boston MA, November 1999.
[231]. M. Deutsch, Y.Vlasov, D. J. Norris, "Polymer photonic crystal", Material Research Society Meeting, Boston MA, November 1999.
[232]. Y.Vlasov, M. Deutsch, T. Thio, E. Dujardin, Nan Yao, A. A. Sirenko, I. A. Akimov, and D. J. Norris "Silver photonic crystals via self-assembly" Material Research Society Meeting, Boston MA, November 1999.
[233]. Y.Vlasov, D. J. Norris, M. Deutsch, Nan Yao, "Semiconductor quantum dot photonic crystals" VI International conference on Optics of Excitons in Confined Systems, Ascona, Switzerland, August 1999.
[234]. V. V. Nikolaev, M. I. Kaliteevski, Y.Vlasov "Light localization in a disordered photonic crystal", International Symposium " Nanostructures: Physics and Technology ", St.-Petersburg, Russia, June 1999.
[235]. Y.Vlasov, D. J. Norris, M. Deutsch, Nan Yao, "Semiconductor quantum dot photonic crystals" Conference on Lasers and Electro-Optics/ Quantum Electronics and Laser Science Conference (CLEO/QELS-99), Baltimore MD, May 1999.
[236]. D. J. Norris, M. Deutsch, Nan Yao, "Quantum dot photonic crystal", American Physical Society Centennial Meeting, Atlanta GA, March 1999.
[237]. Y.Vlasov, M. I. Kaliteevski, V. V. Nikolaev, "Different regimes of light localization in a disordered photonic crystal", American Physical Society Centennial Meeting, Atlanta GA, March 1999.
[238]. Y.Vlasov, V. N. Astratov, A.V. Baryshev, A. A. Kaplyanskii, O. Z. Karimov, M. F. Limonov, "Optical studies of intrinsic fundamental defects in a self-organized opal photonic crystal", American Physical Society Centennial Meeting, Atlanta GA, March 1999.
[239]. S. Petit, Y.Vlasov, G. Klein, B. Hönerlage, Ch. Hirlimann, "Femtosecond Measurements of the Time-of-flight of Photons in a Three-dimensional Photonic Crystal", American Physical Society Centennial Meeting, Atlanta GA, March 1999.
[240]. D. J. Norris, Y.Vlasov, Nan Yao, "Quantum dot photonic crystal", Workshop on Electromagnetic Crystal Structures, Design, Synthesis, and Applications (WECS), California, January, 1999.
[241]. Y.Vlasov, M. I. Kaliteevski, V. V. Nikolaev, "Different regimes of light localization in a disordered photonic crystal" Workshop on Electromagnetic Crystal Structures, Design, Synthesis, and Applications (WECS), California, January 1999.
[242]. S. Petit, Y.Vlasov, G. Klein, B. Hönerlage, Ch. Hirlimann, "Femtosecond measurements of the time-of-flight of photons in a 3D photonic crystal", Workshop on Electromagnetic Crystal Structures, Design, Synthesis, and Applications (WECS), California, January 1999.
[243]. Y.Vlasov, V. N. Astratov, A.V. Baryshev, A. A. Kaplyanskii, O. Z. Karimov, M. F. Limonov, "Optical studies of intrinsic fundamental defects in a self-organized opal photonic crystal" Workshop on Electromagnetic Crystal Structures, Design, Synthesis, and Applications (WECS), California, January 1999.
[244]. Y.Vlasov, B. Hönerlage, R. Levy, D. Ohlmann, "Lasing in photonic crystal", French National Meeting on Lasers and Quantum Optics "Colloque 5", Strasbourg, France, August 1997.
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[247]. Y.Vlasov, B. Hönerlage, I. Pelant, K. Luterova, V. N. Astratov, " Enhancement of the optical gain in a semiconductor embedded in a 3D photonic crystal " The Summer School at Les Houches " Miniature coherent light sources ", Les Houches, France, June 1997.
[248]. V.N. Astratov, Y.Vlasov, O.Z. Karimov, A.A. Kaplyanskii, Yu. G. Musikhin, N.A. Bert, V.N. Bogomolov, A.V. Prokofiev, "Photonic band structure of 3D ordered silica matrices", 9th International Symposium on Superlattices, Microstructures and Microdevices, Liege, Belgium, August 1996.
[249]. Y.Vlasov, V. N. Astratov, A. A. Kaplyanskii, V. N. Bogomolov, A. V. Prokofiev, "Photonic bands and gaps in 3D ordered SiO_2 matrices", 4th International Symposium " Nanostructures: Physics and Technology ", St.-Petersburg, Russia, June 1996.
[250]. Y.Vlasov, V.N. Astratov, A.A. Kaplyanskii, V.N. Bogomolov, S.M. Samoilovich, L.A. Samoilovich " Photonic band gap effects in opal matrices with CdS embedded in its pores ", 4th International Conference on Optics of Excitons in Confined Systems, Cortona, Italy, August 1995.

[251]. Y.Vlasov, V.N. Astratov, A.A. Kaplyanskii, V.N. Bogomolov, S.M. Samoilovich, L.A. Samoilovich " Photonic band gap effects in opal matrices ", 3d International Symposium " Nanostructures: Physics and Technology ", St.-Petersburg, Russia, June 1995.
[252]. V.N. Astratov, O. Z. Karimov, Y.Vlasov, " MQW probe technique with wedge-like structures for characterization of post-growth processing", 2nd International Workshop " Expert evaluation of new materials for technological applications" (EXMATEC), Parma, Italy, August 1994.
[253]. V. N. Astratov, O. Z. Karimov, M. B. Melnikov, Y.Vlasov, " Photoinduced band flattening effect in structures with near-surface quantum wells", 14th General Conference of Condensed Matter Division of European Physical Society, Madrid, Spain, July 1994.
[254]. Y.Vlasov, V. N. Astratov, O.Z. Karimov, " Photoinduced band flattening studied by MQW probe technique" 2nd International Symposium " Nanostructures: Physics and Technology ", St.- Petersburg, Russia, June 1994.
[255]. Y.Vlasov, V. N. Astratov, O. Z. Karimov, " Photoluminescence of near-surface GaAs/AlGaAs quantum wells ", 3d International conference on Optics of Excitons in Confined Systems, Montpellier, France, August 1993.
[256]. V. N. Astratov, Y.Vlasov, " Photoluminescence of near-surface quantum wells - influence of the band bending ", European Material Research Society Spring Meeting, Strasbourg, France, July 1993.
[257]. V. N. Astratov, Y.Vlasov, " Exciton spectroscopy of near-surface GaAs/AlGaAs quantum wells ", 17th International Conference on Defects in Semiconductors, Gmunden, Austria, June 1993.
[258]. V. N. Astratov, Y.Vlasov, " Photoluminescence of near-surface GaAs/AlGaAs quantum wells", 13th General Conference of the Condensed Matter Division of EPS, Regensburg, Germany, September 1993.
[259]. Y.Vlasov, I. P. Ipatova, V. A.. Shchukin, D. L. Fedorov, E. G. Kuzminov, "Raman scattering by optical phonons in uniaxial crystals with one-dimensional disorder ", 13 International Conference on Raman Scattering, Wuerzburg, Germany, August 1992.

III. INVITED PRESENTATIONS AND SEMINARS

[1]. May 2018, Distinguished Lecture, IMT EPFL
[2]. April 2015, University of Michigan Ann Arbor, ECE
[3]. March 2015, Boston University, Photonics Center
[4]. March 2015, Stanford University, ECE
[5]. February 2015, Purdue University, ECE
[6]. February 2015, University of Illinois Urbana-Champaign
[7]. December 2014, Harvard SEAS
[8]. September 2014, Cornell ECE
[9]. April 2014, University of California Los Angeles, ECE
[10]. February 2014, HHMI Janelia Farm Research Campus
[11]. December 2013, ETH Zurich, Electrical Engineering Department
[12]. November 2013, MIT, Research Laboratory of Electronics
[13]. May 2013, California NanoSystems Institute, UCLA EE Department
[14]. April 2013, Princeton University, EE Department
[15]. July 2012, University of Toronto
[16]. May 2012, Purdue, ECE
[17]. September 2011, GE Corporate HQ
[18]. March 2011, Yale, ECE
[19]. February 2011, Optoelectronic Industry Development Association (OIDA), San Jose
[20]. November 2010, University of Toronto
[21]. October 2010, Yale University, Physics
[22]. October 2009, Optoelectronic Industry Development Association (OIDA), Santa Clara
[23]. October 2009, Ghent University, EE Department
[24]. May 2009, Harvard University, EA Dept
[25]. April 2008, MIT, EECS
[26]. October 2007, Lehigh University, EE Department
[27]. June 2007, University of North Carolina, Department of Physics
[28]. April 2007, Carnegie Mellon University, EE Department
[29]. August 2006, University of Sydney, Australian Center for Ultrahigh Bandwidth Devices for Optical Systems
[30]. July 2006, Cornell University, Center for Nanoscale Science
[31]. May 2006, Univ. Michigan, Ann Arbor, EE Department
[32]. April 2006, Purdue University, EE Department,
[33]. February 2005, Cornell University, EE&AP
[34]. April 2004, Purdue University, EE Department
[35]. March 2003, Columbia University, EE Department

[36]. March 2003, Cornell University, ECE Department
[37]. November 2001, Princeton University, EE Dept.
[38]. May 2001, Institute of Optics, University of Rochester
[39]. March 2001, IBM TJ Watson Research Center, Yorktown Heights
[40]. November 2000, Ecole Normale Superieure, Cachan, France,
[41]. June 2000, Lucent Technologies (Optoelectronics Center), Breinigsville, PA
[42]. April 2000, Bell Labs, Lucent Tech., Murray Hill, NJ
[43]. April 2000, Georgia Institute of Technology, Physics Dept.
[44]. March 2000, Princeton University, EE Dept.
[45]. March 2000, Northwestern University, Materials Sci. Dept.
[46]. November 1999, CUNY, City College, CAT, NYC
[47]. June 1998, CUNY, Queens College, Dept. Physics, NY
[48]. November 1997, AlliedSignal Research Division, Morristown, NJ
[49]. October 1997, University of Exeter, Dept. of Physics, Exeter, UK
[50]. July 1997, University of Amsterdam, Dept. of Physics, Amsterdam, The Netherlands
[51]. May 1997, Université Paris-Sud, Institute Electronique Fondamentale, Paris, France,
[52]. Septembre 1995, Instituto Metodologie Avanzate Inorganishe, Roma, Italy
[53]. August 1994, UCSB, EE Dept., Center for Quantized Electronic Structures (QUEST), CA
[54]. August 1993, LAAS CNRS, Toulouse, France
[55]. January 1992, University of Regensburg, Dept. of Physics, Regensburg, Germany
[56]. January 1992, Techniche Universitat Munchen, Physics Department, Munich, Germany