Miloš A. Popović – CV

University of Colorado, Boulder
Engineering Center, Room EE1B48 – 1111 Engineering Drive
Boulder, Colorado 80309-0425

Tel: (303) 492-5304
Email: milos.popovic@colorado.edu
Webpage: http://ecee.colorado.edu/~popovicm

FIELD OF INTEREST

Silicon photonics, nanophotonics and optoelectronics. Advanced CMOS photonics-electronics integration; energy efficient, scalable CMOS systems. Nano-optomechanics, optical forces, smart self-adaptive photonic systems. Quantum integrated photonics. Photonic device and circuit theory and fundamental limits. Strongly nonlinear and time-dependent systems, all-optical feedback, optical frequency combs.

EDUCATION

Massachusetts Institute of Technology (Feb 2002–Sep 2007) **Cambridge, MA**
Ph.D. in Electrical Engineering Advisors: H.A. Haus (2002-3); E.P. Ippen, F.X. Kärtner (2003-7)
Thesis: "Theory & design of high-index-contrast microphotonic circuits" Minor: Applied Math

Master of Science in Electrical Engineering (Feb 2000–Feb 2002) GPA: 5.0/5.0
Thesis: "Air trenches for dense silica integrated optics" Advisor: H.A. Haus

Queen's University (Sep 1995–Apr 1999) **Kingston, Ontario, Canada**
Bachelor of Science in Electrical Engineering (graduated ranked 1st of 106)
Thesis: "Microwave power transmission for terrestrial applications" Advisor: A.P. Freundorfer

AWARDS & HONORS

- **Fellow, The Lucile & David Packard Foundation, $875,000** over 5 years (2012-2017): One of 16 awarded across all fields of science & engineering, by committee of top US academics
- Dean's Faculty Fellow, University of Colorado Boulder (2012)
- **Donnelly/GE Faculty Fellow, U. Colorado Boulder, ~$60,000** over 6 years (2010-2016)
- **MIT Presidential Fellow** (2000)
- National Science and Engineering Research Council of Canada Graduate Fellow (2000-2001)
- Best poster prize: "Compact waveguide bends in low-index-contrast", MIT Materials Day (2000)
- **University Medal in Electrical Engineering** (1999 top-ranked graduate)
- **Team 2nd place, 1999 World Solar Challenge** – 2000-mile solar car race across Australian desert.
- Queen's University Chancellor's Scholar (1995-1999 full scholarship, one of 6 awarded)
- **1st Prize – North America-wide Motorola University Electronics Design Contest** (1998, with K. Koo, $55,000 prize) for project: "Smart cruise control and telemetry system for a solar vehicle"

PUBLICATIONS: 16 U.S. patents, 112 papers [31 journal (2 invited), 81 conference (28 invited)], 2 chapters
[this publication list, with full PDFs for recent papers, is accessible at http://plab.colorado.edu]
H-index: 23 (as of Oct 2013)

EXPERIENCE

Assistant Professor **University of Colorado, Boulder**
Department of Electrical, Computer and Energy Engineering Jan 2010-present

Funded projects:

Role: **Principal Investigator**
Project: "Light Forces Based, Classical and Quantum Photonics On-Chip"
Funding: $875k over 5-year effort; The David & Lucile Packard Foundation

Program to demonstrate photonic device technology where nanometer-scale optical confinement in silicon nanowires on-chip give rise to unique physics based on appreciable light forces and tailorable nonlinearity. Goals are to enable ultra-low-energy, "smart", self-adaptive circuits, and technology for communication and computation using quantum mechanics.

Role: **Co-Principal Investigator (on 3-institution team); Lead PI CU Boulder part**
Project: "Memory System with Monolithic CMOS Photonic Networks for High-performance, Energy-efficient Embedded Manycore Machines"
Funding: $1.05M (total team $15M=$7M universities, $8M industry) over total 3.5-year effort, 2 phases; DARPA POEM Program (Sep 2011-Feb 2015)
Collaborators: Prof. V. Stojanovic (MIT), Prof. R. Ram (MIT), Prof. K. Asanovic (Berkeley)

Program to design novel nanophotonic device technology that is compatible with current state-of-the-art CMOS process flows (used for microprocessors, DRAM, and mixed-signal ICs) to enable photonics in state of the art microelectronics, and to arrive at communication networks with unprecedented levels of energy efficiency (energy per bit of information) by leveraging photonic communication and electronic processing on chip. This effort is a follow-on of a seedling, below.

Role: **Principal Investigator**
Project: "Molding Optical Field Patterns for Highly Efficient Design of Strong-Confinement Photonic Devices"
Funding: $372k = $360k main grant + $12k REU supplement; NSF (6/2011-5/2014)

Investigating devices based on a new type of Bloch wave, and developing efficient modulators, thermo-optically tunable devices, and optomechanical structures based on these concepts.

Role: **Co-Principal Investigator (subcontract; PI on CU Boulder part)**
Project: "Memory System with Monolithic CMOS Photonic Networks for High-performance, Energy-efficient Embedded Manycore Machines"
Funding: $110k; DARPA seedling (Oct 2010-March 2011)

See DARPA POEM program above. This effort is a direct follow-on of a successful seedling effort on "Hitless High-Speed Switches", listed below.

Visiting Assistant Professor **University of Colorado, Boulder**
Department of Electrical, Computer and Energy Engineering Jul 2009–Dec 2009

Postdoctoral Associate **Research Laboratory of Electronics, MIT (Cambridge, MA)**
Supervisors: Profs. Erich P. Ippen and Franz X. Kärtner Sep 2007–Dec 2009

Primary activity: Conducted three research efforts in roles of PI and co-PI, as summarized:

Role: **Principal Investigator**
Project: "Opto-Nanomechanical Self-Adaptive Photonic Devices Based on Light Forces"
Funding: $125k, Advanced Concepts Committee, MIT Lincoln Lab (10/2008-12/2009)
Collaborators: Peter T. Rakich (Sandia National Lab), David O. Caplan (MIT Lincoln Lab)

Independently proposed and secured funding for a 1-year seedling effort to demonstrate self-adaptive photonic devices, based on light forces in nanophotonic structures and interplay of the motion caused by their action, and the effect of this motion back on the optical properties.

Role: **Principal Investigator** (subcontract from MIT Lincoln Lab, Lead PI D. Caplan)
Project: "Compact Power-efficient High-performance WDM Transmitters"
Funding: $120k, Advanced Concepts Committee, MIT Lincoln Lab (3/2009-12/2009)

Provided integrated-photonics-based device concepts and designs for low size, weight and power chip-scale transmitters.

Role: **Co-Principal Investigator** (jointly with Prof. Rajeev Ram)
Project: "Hitless High-speed Switches for Integrated Photonic Networks"
Funding: $490k, DARPA Seedling on "Low Loss Bulk CMOS Waveguides" (Oct 2008-Aug 2009)

Proposed core device concept and led (as PI) a 7-faculty research proposal on "hitless" nanophotonic high-speed switches for on-chip multicore processor photonic interconnects with large aggregate bandwidth (Tb/s). Successfully obtained DARPA funded seedling effort.

Other activity: Contributed to projects on telecom nanophotonic devices; intrachip photonic interconnects (V. Stojanovic, PI; 2007-); electronic-photonic integrated circuits (F. Kaertner, PI; 2004-) through work on slow light, dispersionless filters, energy-efficient modulators. Working with T. Barwicz, IBM T.J. Watson Research Center (2006-) on a nanophotonics-based maskless lithography tool.

Graduate Research Assistant **Research Laboratory of Electronics, MIT (Cambridge, MA)**
Supervisors: Profs. H.A. Haus (2000–03); E.P. Ippen and F.X. Kärtner (2003–07) Feb 2000–Sep 2007

Research: Theory and design of strong-confinement nanophotonic devices for telecom applications. Proposed and led theory-to-experiment effort for the first telecom-grade silicon nanophotonic filters and errorless wavelength switches. Invented 7 different nanophotonic device technologies, licensed by Pirelli Labs. Developed rigorous simulation tools: 3D complex-frequency modesolvers, film-matching field solvers, parallelized 3D FDTD (for supercomputers).

Grants: Contributed to 3 successful proposals: MIT-Pirelli R-OADM (2001-06); DARPA Photonic A/D Converters (2004-); DARPA Intrachip Photonics (seedling effort) (2006-07).

Co-Project Leader, Electrical Team Manager **Queen's University Solar Vehicle Team (Canada)**
Team advisor: Prof. Stephen J. Harrison (Queen's University, Kingston, Canada) Sep 1995–Dec 1999

Team accomplishments: 2nd place in 1999 World Solar Challenge (3200km, Darwin to Adelaide, Australia) – top ever placing by student team. 2nd place in 1999 Sunrayce USA (Washington-Orlando).
Technical: Built 2 complete solar vehicles with 15-person team. Energy-efficiency-aimed design of: telemetry/cruise electronics, NiMH-cell custom battery pack, 20% solar array conformal to aerobody.

TEACHING EXPERIENCE

University of Colorado Boulder: Introduction to Photonics (ECEN4106, undergrad) – Fall 2011; Physical Optics (ECEN5645, graduate) – Fall 2013; Silicon Photonics (ECEN6006, graduate) – Fall 2010, 2012; Intro to Optical Electronics (ECEN4645/5645, graduate) – Spring 2010, 2012; **Harvard University:** Guest Lecturer for Prof. M. Loncar, Optics and Photonics (ES273, grad) – Dec 2008; MIT: Guest Lecturer for Prof. Karl K. Berggren, Nanostructure Fabrication (6.781J, grad) – Spring 2007.

Co-Supervisor of Master of Engineering Thesis **MIT (Cambridge, MA)**
Advisor: Prof. Franz X. Kärtner Sep 2005-July 2006
Thesis: M. Fan, "Efficient Out-of-Plane Microphotonic Fiber-to-Chip Coupler Designs" (MIT, June 2006)

SERVICE

Member: IEEE (1998-present), Optical Society of America (2005-present), SPIE (2008-2011)

Reviewer for: IEEE Photon. Technol. Lett., J. Lightwave Technol., IEEE J. Quantum Electron. Opt. Commun., Optics Express, Appl. Phys. Lett., Optics Letters, Nature Commun., Nature Nanotechnology, Nature Scientific Reports.

NSF EPMD Proposal Review Panel, Nov 2011; DOE SBIR Panel, Oct 2012

Serving on Technical Program Committees:
Subcommittee Chair, Integrated Photonics Research Conference, IPR (2011-present)
TPC member, Conference on Lasers and Electro-Optics, CLEO (2010-2012)
TPC member, Optical Fiber Communication Conference, OFC (2011-present)
TPC member, IEEE Group IV Photonics, GFP (2012-present)
TPC member, IEEE Photonics Conference, IPC (2013-present)

Local Chair, OSA Optics & Photonics Congress, Colorado Springs, CO, July 2012.

Invited participant/contributor, NSF Workshop on Emerging Technologies in Interconnects, Feb 2012

US STATUS Permanent resident (Green Card holder)

CITIZENSHIP Canadian **BORN** Zajecar, Serbia (Apr 21, 1977)

LANGUAGES English (native speaker), French (proficient), Serbo-Croat (native speaker).

PUBLICATIONS

2 book chapters, 16 patents, 112 papers: 31 journal (2 invited), 81 conference (28 invited)

[this publication list, with full PDF available for recent paper, is accessible at http://plab.colorado.edu]

H-index: 24 (as of Jan 2014)

Theses:

T2. M. Popović, "Theory and design of high-index-contrast microphotonic circuits," Ph.D. Thesis, Dept. of Elec. Engineering and Computer Science, Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts, USA, Feb. 2008.

T1. M. Popović, "Air trenches for dense silica integrated optics," M.S. Thesis, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts, USA, Feb. 2002.

Book Chapters:

B2. K. Wada, J.F. Liu, S. Jongthammanurak, D.D. Cannon, D.T. Danielson, D.H. Ahn, S. Akiyama, M. Popović, D.R. Lim, K.K. Lee, H.-C. Luan, Y. Ishikawa, X. Duan, J. Michel, H.A. Haus and L.C. Kimerling, "Si Microphotonics for Optical Interconnection," in *Optical Interconnects, The Silicon Approach*, L. Pavesi and G. Guillot, Eds., Springer Series in Optical Sciences, vol. 119, Springer, 2006, Chapter 11, p. 291-310.

B1. H.A. Haus, M. Popović, M.R. Watts, C. Manolatou, B.E. Little, S.T. Chu, "Optical resonators and filters," in *Optical Microcavities* (Adv. Series in Appl. Phys., vol. 5), Kerry Vahala, Ed., World Scientific, 2004.

Patents (16 granted, 5 pending):

P20. M.A. Popović and K. Nammari, "CMOS photonics fiber-chip and intra/inter-chip couplers," US Provisional Patent Application, **University of Colorado Case CU3255B** (filed January 10, 2013).

P19. M.A. Popović and M. Wade, "Pole-zero resonant demultiplexers," US Provisional Patent Application, **University of Colorado Case CU3254B** (filed January 10, 2013).

P18. M.A. Popović, "Ring optical-wiggler-mode resonators," US Provisional Patent Application, **University of Colorado Case CU3253B** (filed January 10, 2013).

P17. M.A. Popović and X. Zeng, "Micro-optical parametric oscillators, amplifiers and wavelength converters," US Provisional Patent Application, **University of Colorado Case CU3252B** (filed January 10, 2013).

P16. S.J. Spector, R.B. Swint and M.A. Popović, "Waveguide coupler having continuous three-dimensional tapering," **U.S. Patent 8,472,766** (filed on Aug 10, 2010, issued Jun 25, 2013).

P15. M.A. Popović, "Cavity-dynamics Compensation in Resonant Optical Modulators," **U.S. Patent 8,483,521** (filed on May 28, 2010; issued July 9, 2013).

P14. M.A. Popović, "Resonant optical modulators," MIT Case 13538, filed Jan 27, 2010 as U.S. Patent Application No. 12/630,322 (granted Sep 17, 2012).

P13. M.A. Popović, "Low-loss Bloch waves in optical waveguide structures and compact, efficient waveguide-crossing arrays," **U.S. Patents US 7,903,909 and 8,116,603** (filed Oct 2007, issued Mar 8, 2011 and Feb 14, 2012).

P12. P.T. Rakich and M.A. Popović, "Controlling optical resonances via optically induced potentials," **U.S. Patent 7,583,874** (filed Oct 2007, granted Sep 1, 2009).

P11. C.W. Holzwarth, J.S. Orcutt, M.A. Popović, J.L. Hoyt and R.J. Ram, "Reduction of substrate optical leakage in integrated photonic circuits through localized substrate removal," **U.S. Patent 7,920,770** (filed Oct 2007, granted Dec 17, 2010, issued Apr 5, 2011).

P10. M. Popović, "Optical coupled-resonator structures based on loop-coupled cavities and loop coupling phase," **U.S. Patent 7,539,375** (filed Apr. 2007, issued Mar 26, 2009); also U.S. Patent Application 20090290835, pending.

P9. M. Popović, "Hitless tuning and switching of resonator amplitude and phase responses," **U.S. Patent 8,655,114**, (filed Mar 2007, issued Feb 2014).

P8. M. Popović and T. Barwicz, "Fabrication tolerant silicon waveguides and resonators," **U.S. Patent 7,853,108** (filed Dec. 2006, granted Dec 14, 2010).

P7. M. Popović, "Group-delay-balanced bypass circulators and folded universally balanced interferometers," **U.S. Patent 8,111,994** (filed Aug. 2006, issued Feb 7, 2012).

P6. T. Barwicz and M. Popović, "Microphotonic maskless lithography system," U.S. Patent Application 20080014534, filed July 2006, pending.

P5. M. Popović, "Wide free-spectral-range, widely tunable and hitless-switchable optical channel add-drop filters," International Patent Application WO2007014218, filed July 2005, U.S. Patent Application 20090220228.

P4. T. Barwicz, M.R. Watts, M. Popović and C. Manolatou, "Precise and permanent modification of the resonant frequency of a dielectric microcavity and correction of frequency shifts in dielectric coupled-resonator filters," **U.S. Patents 7,343,067 and 7,450,800** (filed Sep 2004; granted March 11, 2008 and Nov 11, 2008).

P3. H.A. Haus, M.A. Popović, M.R. Watts, C.W. Wong and L.C. Kimerling, "Hitless switch for high-density integrated optics," **U.S. Patent 7,424,181** (filed Jan 2004, granted Sep. 2008).

P2. M. Popović, "Optical coupled-resonator filters with asymmetric coupling," **U.S. Patent 7,292,751** (filed July 2003; granted Nov. 2007).

P1. L.C. Kimerling, K. Wada, H.A. Haus, M. Popović and S. Akiyama, "Optical waveguides with trench structures," **U.S. Patent 6,621,972** (filed Oct 2001; granted Sep 2003).

Journal Papers: (Invited papers indicated by *)

Manuscripts under review:

Pending:

J33. C. M. Gentry and M.A. Popović, "Dark state lasers," *submitted to Optics Letters.*

J32. Y. Liu and M.A. Popović, "High-Q Contacted Ring Microcavities with Scatterer-Avoiding "Wiggler" Bloch Wave Supermode Fields," *submitted to Appl. Phys. Lett.*

J31. X. Zeng and M.A. Popovic, "Design of micro-optical parametric oscillators based on third-order nonlinearity," *submitted to Physical Review A.*

Published or accepted:

2014

J30. K. Mehta, J.S. Orcutt, J.M. Shainline, O. Tehar-Zahav, Z. Sternberg, R. Meade, M.A. Popovic and R.J. Ram, "Polycrystalline silicon ring resonator photodiodes in a bulk CMOS process," **Optics Letters** 39, 1061 (Feb 2014).

J29. Y. Liu, J.M. Shainline, X. Zeng and M.A. Popovic, "Ultra-low-loss CMOS-Compatible Waveguide Crossing Arrays Based on Multimode Bloch Waves and Imaginary Coupling," **Optics Letters** 39, 335 (Jan 2014).

2013

J28. D. Jalas, A. Petrov, M. Eich, W. Freude, S. Fan, Z. Yu, R. Baets, M.A. Popović, A. Melloni, J.D. Joannopoulos, M. Vanwolleghem, C.R. Doerr, H. Renner, "What is - and what is not - an optical isolator?", **Nature Photonics** 7, Aug 2013.

J27. J.M. Shainline, J.S. Orcutt, M.T. Wade, K. Nammari, O. Tehar-Zahav, Z. Sternberg, R. Meade, R.J. Ram, V. Stojanović and M.A. Popović, "Depletion-mode polysilicon optical modulators in a bulk CMOS process," **Optics Letters** 38, 2729 (2013).

J26. J.M. Shainline, J.S. Orcutt, M.T. Wade, K. Nammari, B. Moss, M. Georgas, C. Sun, R.J. Ram, V. Stojanović, R. Ram, V. Stojanović and M.A. Popović, "Depletion-mode carrier-plasma optical modulator in zero-change advanced CMOS," **Optics Letters** 38, 2657 (2013).

J25. M.T. Wade and M.A. Popović, "Efficient wavelength multiplexers based on asymmetric response filters," **Optics Express** 21, 10903-10916 (2013).

J24. A. Petrov, D. Jalas, M. Eich, W. Freude, S. Fan, Z. Yu, R. Baets, M. Popović, A. Melloni, J.D. Joannopoulos, M. Vanwolleghem, C.R. Doerr and H. Renner, "Comment on 'Linear and passive silicon optical isolator' in Scientific Reports 2, 674". **arXiv** preprint arXiv:1301.7243 (2013). (Note: This paper on ArXiV is the permanent record of this work because the journal editors at Scientific Reports refused to publish this critique and correction to the paper on which we are commenting.)

2012

J23. J.S. Orcutt, B. Moss, C. Sun, J. Leu, M. Georgas, J. Shainline, E. Zgraggen, H. Li, J. Sun, M. Weaver, S. Urosevic, M.A. Popovic, R.J. Ram and V.M. Stojanovic, "An Open Foundry Platform for High-Performance Electronic-Photonic Integration", **Optics Express** 20, 12222-12232 (2012).

J22. A. Khilo, S.J. Spector, M.E. Grein, A.H. Nejadmalayeri, C.W. Holzwarth, M.Y. Sander, M.S. Dahlem, M.Y. Peng, M.W. Geis, N.A. DiLello, J.U. Yoon, A. Motamedi, J.S. Orcutt, J.P. Wang, C.M. Sorace-Agaskar, M.A. Popović, J. Sun, G.R. Zhou, H. Byun, J. Chen, J.L. Hoyt, H.I. Smith, R.J. Ram, M. Perrott, T.M. Lyszczarz, E.P. Ippen, F.X. Kärtner, "Photonic ADCs come of age: overcoming the bottleneck of electronic jitter," **Optics Express** 20, 4454-4469 (2012).

J21. S. Fan, R. Baets, A. Petrov, Z. Yu, J.D. Joannopoulos, W. Freude, A. Melloni, M. Popović, M. Vanwolleghem, D. Jalas, M. Eich, M. Krause, H. Renner, E. Brinkmeyer, C.R. Doerr, "Comment on 'Nonreciprocal Light Propagation in a Silicon Photonic Circuit'", **Science** 335, 38 (Jan 2012).

2011

J20. J.S. Orcutt, A. Khilo, C.W. Holzwarth, M.A. Popović, H. Li, J. Sun, T. Bonifield, R. Hollingsworth, F.X. Kärtner, H.I. Smith, V. Stojanović, R.J. Ram, "Nanophotonic integration in state-of-the-art CMOS foundries," **Optics Express** 19, 2335-2346 (2011).

2010

J19. C.W. Holzwarth, A. Khilo, M. Dahlem, M.A. Popović, F.X. Kärtner, E.P. Ippen and H.I. Smith, "Device architecture and precision nanofabrication of microring-resonator filter banks for integrated photonic systems," **J. Nanoscience and Nanotechnology** 10(3):2044-52, March 2010.

J18. A. Khilo, M.A. Popović, M. Araghchini, and F.X. Kärtner, "Efficient planar fiber-to-chip coupler based on two-stage adiabatic evolution," **Optics Express** 18, 15790-15806 (2010).

2009

J17. P.T. Rakich, M.A. Popović, and Z.H. Wang, "General treatment of optical forces and potentials in mechanically variable photonic systems," **Optics Express** 17, 18116-18135 (2009).

*J16. C. Batten, A. Joshi, J. Orcutt, A. Khilo, B. Moss, C. Holzwarth, M. Popović, H. Li, H. Smith, J. Hoyt, F. Kärtner, R. Ram, V. Stojanović, K. Asanović, "Building Manycore Processor-to-DRAM Networks with Monolithic CMOS Silicon Photonics (Invited)", **IEEE Micro**, Special Issue on Hot Interconnects, July/August 2009, p. 8-21.

2008

J15. S.J. Spector, M.W. Geis, G.-R. Zhou, M.E. Grein, R.T. Schulein, F. Gan, M.A. Popović, J.U. Yoon, D.M. Lennon, E.P. Ippen, F.X. Kärtner and T.M. Lyszczarz, "CMOS-Compatible Dual-Output Wideband Silicon Modulator for Analog Signal Processing," **Optics Express** 16, 11027-11031 (July 2008).

J14. T. Barwicz, C.W. Holzwarth, P.T. Rakich, M.A. Popović, E.P. Ippen and Henry I. Smith, "Optical loss in silicon microphotonic waveguides induced by metallic contamination," **Appl. Phys. Lett.** 92, 131108 (2008).

2007

J13. P.T. Rakich, M.A. Popović, M. Soljačić and E.P. Ippen, "Trapping, corralling and spectral bonding of optical resonances through optically induced potentials," **Nature Photonics** 1, 658-665 (Nov. 2007).

*J12. T. Barwicz, H. Byun, F. Gan, C.W. Holzwarth, M.A. Popović, P.T. Rakich, M.R. Watts, E.P. Ippen, F.X. Kärtner, H.I. Smith, J.S. Orcutt, R.J. Ram, V. Stojanović, O.O. Olubuyide, J.L. Hoyt, S. Spector, M. Geis, M. Grein, T. Lyszczarz and J.U. Yoon, "Silicon photonics for compact, energy-efficient interconnects (Inv.)," **J. Optical Networking** 6, 63-73 (2007), http://www.opticsinfobase.org/abstract.cfm?URI=JON-6-1-63.

J11. T. Barwicz, M.R. Watts, M.A. Popović, P.T. Rakich, L. Socci, F.X. Kärtner, E.P. Ippen and H.I. Smith, "Polarization-transparent microphotonic devices in the strong confinement limit," **Nature Photonics** 1, 57-60 (Jan. 2007).

2006

J10. C.W. Holzwarth, T. Barwicz, M.A. Popović, P.T. Rakich, E.P. Ippen, F.X. Kärtner, and Henry I. Smith, "Accurate resonant frequency spacing of microring filters without postfabrication trimming," **J. Vac. Sci. Technol. B** 24, 3244-3247 (2006).

J9. M.A. Popović, E.P. Ippen and F.X. Kärtner, "Universally balanced photonic interferometers," **Optics Letters**, vol. 31, no. 18, pp. 2713-2715, September 2006.

J8. M.A. Popović, T. Barwicz, M.R. Watts, P.T. Rakich, L. Socci, E.P. Ippen, F.X. Kärtner and H.I. Smith, "Multistage high-order microring-resonator add-drop filters," **Optics Letters**, vol. 31, no. 17, pp. 2571-2573, September 2006.

J7. T. Barwicz, M.A. Popović, M.R. Watts, P.T. Rakich, E.P. Ippen and H.I. Smith, "Fabrication of Add-Drop Filters Based on Frequency-Matched Microring Resonators," **J. Lightwave Technol.**, vol. 24, no. 5, May 2006, pp. 2207-2218.

J6. H.A. Haus, M.A. Popović and M.R. Watts, "Broadband hitless bypass switch for integrated photonic circuits," **IEEE Photon. Technol. Lett.**, vol. 18, no. 10, pp. 1137-1139, May 2006.

J5. M.A. Popović, C. Manolatou and M.R. Watts, "Coupling-induced resonance frequency shifts in coupled dielectric multi-cavity filters", **Opt. Express** 14, 1208-1222 (Feb. 2006), http://www.opticsinfobase.org/abstract.cfm?URI=oe-14-3-1208.

J4. P.T. Rakich, M.A. Popović, M.R. Watts, T. Barwicz, H.I. Smith and E.P. Ippen, "Ultrawide tuning of photonic microcavities via evanescent field perturbation," **Optics Letters**, vol. 31, no. 9, May 2006, pp. 1241-1243.
*[Selected to be featured in **Virtual Journal of Nanoscale Science & Technology**, Vol. 13, Issue 20 (May 22, 2006).]*

2005

J3. S. Akiyama, M.A. Popović, P.T. Rakich, K. Wada, J. Michel, H.A. Haus, E.P. Ippen and L.C. Kimerling, "Air trench bends and splitters for dense optical integration in low index contrast," **J. Lightwave Technol.**, vol. 23, no. 7, pp. 2271-2277, Jul 2005.

2004

J2. T. Barwicz, M.A. Popović, P.T. Rakich, M.R. Watts, H.A. Haus, E.P. Ippen and H.I. Smith, "Microring-resonator-based add-drop filters in SiN: fabrication and analysis," **Optics Express**, vol. 12, no. 7, Apr 2004.

2002

J1. M. Popović, K. Wada, S. Akiyama, H.A. Haus and J. Michel, "Air trenches for sharp silica waveguide bends," **J. Lightwave Technol.**, vol. 20, no. 9, pp. 1762-1772, Sep 2002.

Conference Papers: (Invited papers indicated by *)

Submitted:

C84. Chen Sun, Michael Georgas, Jason S. Orcutt, Benjamin R. Moss, Yu-Hsin Chen, Jeffrey Shainline, Mark Wade, Karan Mehta, Kareem Nammari, Erman Timurdogan, Daniel Miller, Ofer Tehar-Zahav, Zvi Sternberg, Jonathan C. Leu, Johanna Chong, Reha Bafrali, Gurtej Sandhu, Michael Watts, Roy Meade, Miloš A. Popović, Rajeev J. Ram and Vladimir Stojanović, "A Monolithically-Integrated Chip-to-Chip Optical Link in Bulk CMOS," submittd to VLSI Symposium 2014.

C83. M. Georgas, B.R. Moss, C. Sun, J. Shainline, J.S. Orcutt, M. Wade, Y.-H. Chen, K. Nammari, J.C. Leu, A. Srinivasan, R.J. Ram, M.A. Popovic and V. Stojanovic, "A Monolithically Integrated Optical Transmitter and Receiver in a Zero-Change 45nm SOI Process," submitted to VLSI Symposium 2014.

C82. Roy Meade, Jason S. Orcutt, Karan Mehta, Ofer Tehar-Zahav, Daniel Miller, Michael Georgas, Ben Moss, Chen Sun, Yu-Hsin Chen, Jeffrey Shainline, Mark Wade, Reha Bafrali, Zvi Sternberg, Galina Machavariani, Gurtej Sandhu, Milos Popović, Rajeev Ram, Vladimir Stojanović, "Integration of Silicon Photonics in Bulk CMOS," submitted to VLSI Symposium 2014.

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C11. M.R. Watts, M. Qi, T. Barwicz, M. Popović, P. Rakich, L. Socci, E.P. Ippen, F. Kaertner and H.I. Smith, "Towards polarization independent high-index contrast microphotonics," presented at XXVIIIth **General Assembly of the International Union of Radio Science (URSI)**, New Delhi, India, Session D07A, Oct 28, 2005.

C10. M.A. Popović, T. Barwicz, M.R. Watts, P.T. Rakich, L. Socci, E.P. Ippen, F.X. Kärtner and H.I. Smith, "Multistage high-order microring-resonator filters with relaxed tolerances for high through-port extinction," in **Conference on Lasers and Electro-Optics (CLEO)**, Baltimore, MD, May 22-27, 2005 *[Highlighted as one of CLEO/QELS Hot Topics papers].*

C9. M.R. Watts, T. Barwicz, M.A. Popović, P.T. Rakich, L. Socci, E.P. Ippen, H.I. Smith and F. Kaertner, "Microring-Resonator Filter with Doubled Free-Spectral-Range by Two-Point Coupling," in **Conference on Lasers and Electro-Optics (CLEO)**, Baltimore, MD, May 22-27, 2005.

C8. M.A. Popović, M.R. Watts, T. Barwicz, P.T. Rakich, L. Socci, E.P. Ippen, F.X. Kärtner and H.I. Smith, "High-index-contrast, wide-FSR microring-resonator filter design and realization with frequency-shift compensation," in **Optical Fiber Communication Conference** (Optical Society of America, Washington, DC, 2005), paper OFK1.

2004

C7. S. Akiyama, K. Wada, J. Michel, L.C. Kimerling, M.A. Popović and Hermann A. Haus, "Air trench waveguide bend for high-density optical integration," **Proc. SPIE Int. Soc. Opt. Eng.** 5355, 14 (2004).

C6. C. Manolatou, M.A. Popović, P.T. Rakich, T. Barwicz, H.A. Haus and E.P. Ippen, "Spectral anomalies due to coupling-induced frequency shifts in dielectric coupled-resonator filters," in Proceedings of **Optical Fiber Communication Conference** (Session TuD5), Los Angeles, CA, February 2004.

C5. T. Barwicz, M.A. Popović, P.T. Rakich, M.R. Watts, H.A. Haus, E.P. Ippen and H.I. Smith, "Fabrication and analysis of add-drop filters based on microring resonators in SiN," in Proceedings of **Optical Fiber Communication Conference** (Session TuL4), Los Angeles, CA, February 2004.

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C4. M. Popović, "Complex-frequency leaky mode computations using PML boundary layers for dielectric resonant structures," in Proceedings of **Integrated Photonics Research** 2003, Washington, DC, June 17, 2003.

C3. S. Akiyama, K. Wada, J. Michel, M. Popović and H. A. Haus, "Realization of Air Trench Waveguide for Future Microphotonics," presented at **Materials Research Society Spring Meeting** 2003, Symposium J, San Francisco, CA, Apr 22, 2003.

2002

C2. M. Popović, K. Wada, S. Akiyama, H.A. Haus and J. Michel, "Micron-size bending radii in silica-based waveguides (design)", in **Proceedings of the SPIE, Integrated Optics: Devices, Materials, and Technologies VI**; Yakov S. Sidorin, Ari Tervonen; Eds., vol. 4640, p. 54-63, June 2002. (Photonics West 2002, San Jose, CA, January 21, 2002); (same title, but different paper than below)

2001

C1. K. Wada, M. Popović, S. Akiyama, H.A. Haus and J. Michel, "Micron-size bending radii in silica-based waveguides," in Proceedings of the **LEOS Summer Topical Meeting on WDM Components**, Copper Mountain, CO, Aug 2001.

Unreferreed Invited Talks and Lectures

UI11. M.A. Popović, "Silicon nanophotonics, optoelectronics and light-forces-based optomechanics for telecommunication and computing applications," presented at the Faculty of Electrical and Electronic Engineering, University of Belgrade, Belgrade, Serbia on Oct. 16, 2009; at McGill University (LEOS Chapter Speaker) on Nov. 11, 2009; at University of Colorado, Boulder on Nov. 17, 2009.

UI10. M.A. Popović, "Toward self-adaptive optonanomechanical photonic devices based on light forces," Optics Seminar Series, Department of Electrical Engineering, Columbia University, Nov 17, 2008.

UI9. M.A. Popović and P.T. Rakich, "Toward self-adaptive optonanomechanical photonic devices based on light forces," Electrical and Computer Engineering Department Seminar, Cornell University, Oct 10, 2008.

UI8. M.A. Popović, "Nanophotonics for Optical Communication and Electronic-Photonic Signal Processing: from Telecom-Grade Wavelength Routers to Nanomachines based on Light Forces," presented at the Photonics Workshop USA-Netherlands, Enschede, Netherlands, June 16, 2008.

UI7. M.A. Popović, "Integrated nanophotonics, optoelectronics and optomechanics: from telecom-grade wavelength routers to light-powered nanomachines," presented at the Faculty of Electrical and Electronic Engineering, University of Belgrade, Belgrade, Serbia, June 25, 2008.

UI6. M.A. Popović and P.T. Rakich, "Toward self-Adaptive devices based on light forces: exploiting nanoscale optomechanics in the strong coupling regime," presented at the 5th Annual Meeting of the MIT Center for Integrated Photonic Systems (CIPS), Cambridge, MA, USA, May 14, 2008.

UI5. P.T. Rakich and M.A. Popović, "Manipulating microcavities with optical forces and potentials: Toward self-aligning "smart" microcavities and picometer-scale optomechanical control (Invited)," IEEE Lasers and Electro-Optics Society (LEOS) Series Seminar, presented at MIT Lincoln Laboratories, Lexington, MA, USA, Jan. 10, 2008.

UI4. M.A. Popović, "Silicon microphotonic circuits for telecommunication applications," presented at the Faculty of Electrical and Electronic Engineering, University of Belgrade, Belgrade, Serbia, Oct. 8-9, 2007.

UI3. M.A. Popović, "Light processors on a silicon chip: optical integrated circuits for telecommunications," presented at the Faculty of Mining Engineering and Information Sciences, Bor, Serbia, Oct. 4, 2007.

UI2. M.A. Popović, T. Barwicz, M.R. Watts, P.T. Rakich, L. Socci, E.P. Ippen, F.X. Kärtner and H.I. Smith, "Taming strong-confinement photonics and building high-performance microring resonator filters (Invited)," presented at the MIT Microphotonics Center Fall Meeting, Cambridge, MA, Oct 19, 2006.

UI1. M. Popović and H.A. Haus, "Loss, switching, tuning and polarization in high-index-contrast integrated optics (Invited)," at the OIDA/PTAP Optical Microresonators Workshop, San Diego, CA, July 2003 (review of group work).

MEDIA COVERAGE OF WORK (SELECTED)

[a more complete list of media coverage of the work is accessible at http://mit.edu/milos/www/pubs.shtml]

N13. "Better Optical Modulators Boost Silicon Photonics," http://www.photonics.com/Article.aspx?AID=55013, and Photonics Spectra magazine, Dec 2013, p. 20. (Press release: http://www.colorado.edu/news/features/cu-mit-breakthrough-photonics-could-allow-faster-and-faster-electronics)

N12. W. Thomas Payne, "MIT researchers develop theory for powering chips with light: electricity eliminated and replaced by single wavelengths of light," Associated Content, posted Nov 15, 2007. (http://www.associatedcontent.com/article/448342/mit_researchers_develop_theory_for.html)

N9. A. Trafton, "MIT works toward 'smart' optical microchips: light-powered micro-machines could advance telecommunications," *MIT Tech Talk*, web edition, posted Thu, Nov 1, 2007 (http://web.mit.edu/newsoffice/2007/optical-control-1101.html). Press release carried by over 20 news websites, including:

"Scientists create smart microchip theory," United Press International, posted Nov 5, 2007. (http://www.upi.com/NewsTrack/Science/2007/11/05/scientists_create_smart_microchip_theory/2426/)

N7. J. Robertson (Associated Press), "MIT Team Details Optics-On-A-Chip Device," *New York Times*, posted Feb 11, 2007. (http://www.nytimes.com/aponline/technology/AP-Optics-on-a-Chip.html).
Also carried by: Forbes.com, USA Today, Boston Globe, Washington Post, BusinessWeek, The China Post, San Francisco Chronicle, International Herald Tribune, Wired Magazine, ABC 5 Eyewitness News, Fox News.

N6. D. Halber, "MIT 'optics on a chip' may revolutionize telecom, computing: Research integrates photonic circuitry on a silicon chip," *MIT Tech Talk*, web edition, posted Thu, Feb 6, 2007 (http://web.mit.edu/newsoffice/2007/optics.html). Press release carried by over 100 news websites, including:

N5. K. Bullis, "A Nano Solution to Increasing Bandwidth - MIT researchers develop microphotonic devices for communications, clearing the way for higher-performance optical networks," *MIT Technology Review Magazine,* web edition, posted Wed, Jan 17, 2007 (http://www.technologyreview.com/read_article.aspx?id=18074&ch=nanotech).

N2. *The National* (Canadian Broadcasting Corporation Nightly News), story (paraphrased): Canadian [Queen's University solar car] team leads World Solar Challenge race across Australian desert, Oct 18, 1999.
Also on the web: "Queens U. [solar car] leading the pack in Australia", posted Oct 18, 1999. (http://www.cbc.ca/world/story/1999/10/18/worldsolarchallenge101899.html)

N1. "Student Winners Announced from Motorola's 1998 University Design Contest", *Business Wire*, on CNN.com, web edition, posted Aug 4, 1998.