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Ph. D. State University of Campinas, Physics “Metallo-Dielectric Semiconductor Nanolasers with Electrical Pumping: the role of the gain media,” 2009-2013

M.S. State University of Campinas, Physics “Semiconductor optical amplifiers with multi-contacts for optical power saturation control,” 2007-2009

B.S. State University of Campinas, Physics “Fabrication and characterization of semiconductor lasers and semiconductor optical amplifiers,” 2003-2007

Other activities:

Member of Optical Society of America.

Books

- Joseph S.T. Smalley, Felipe Vallini, Abdelkrim El Amili and Yeshaiahu Fainman (2016). Photonics for Smart Cities, Smart Cities Technologies, Prof. Ivan Nunes Da Silva (Ed.), InTech.
- L. A. M. Barea, F. Vallini, D. S. L. Figueira, A. da Silva Filho, N. C. FRATESCHI and A. R. Vaz “Si₃N₄/SiO₂ Planar Photonic Structures Fabricated by Focused Ion Beam” chapter in S. Luryi, J. Xu and A. Zaslavsky (eds.), Future Trends in Microelectronics: From Nanophotonics to Sensors to Energy, Wiley-IEEE Press (2010)

Journal Papers

- Sharma R., Puckett M. W., Lin H., Isichenko A., Vallini F., and Fainman Y., “Effect of dielectric claddings on the electro-optic behavior of silicon waveguides,” Optics Letters, v. 41, p. 1185, 2016.
- Puckett M. W., Sharma R., Lin H., Yang M., Vallini F., and Fainman Y., “Observation of second-harmonic generation in silicon nitride waveguides through bulk nonlinearities,” Optics Express, v. 24, p. 16923, 2016.
- Pan S. H., Gu Q., El Amili A., Vallini F., Fainman Y., “Dynamic hysteresis in a coherent high-β nanolaser,” Optica, v. 3, p. 1260, 2016.
- Smalley J. S. T., Vallini F., Gu Q., Fainman Y., “Amplification and Lasing of Plasmonic Modes,” Proceedings of the IEEE, v. PP, p. 1-15, 2016.
- Shahin S., Vallini F., Monifi F., Rabinovich M., Fainman Y., “Heteroclinic dynamics of coupled semiconductor lasers with optoelectronic feedback,” Optics Letters, v. 41, p. 5238, 2016.
- El Amili, Souza M. C. M. M., Vallini F., Frateschi N. C., Fainman Y., “Magnetically controllable silicon microring with ferrofluid cladding,” Optics Letters, v. 41, p. 5576, 2016.
- Sharma R., Puckett M. W., Lin H., Vallini F., and Fainman Y., “Characterizing the effects of free carriers in fully etched, dielectric-clad silicon waveguides” , Applied Physics Letters, (106) 241104 (2015).

- Bondarenko O., Fang C., Vallini F., Smalley J. S. T., and Fainman Y., "Extremely compact hybrid III-V/SOI lasers: design and fabrication approaches", *Optics Express* (23) 3, pp. 2696-2712 (2015).
- Puckett M. W., Vallini F., Grieco A., and Fainman Y., "Multichannel Bragg gratings in silicon waveguides with asymmetric sidewall modulation". *Optics Letters*, v. 40, p. 379, 2015.2.
- Bondarenko O., Fang C., Vallini F., Smalley J. S. T., and FAINMAN Y., "Extremely compact hybrid III-V/SOI lasers: design and fabrication approaches". *Optics Express*, v. 23, p. 2696, 2015.
- Souza M. C. M., Barea L. A. M., Vallini F., Rezende G. F. M., Wiederhecker G. S., and Frateschi N. C., "Embedded coupled microrings with high-finesse and close-spaced resonances for optical signal processing". *Optics Express*, v. 22, p. 10430, 2014.4.
- Gu Q., Shane J., Vallini F., Wingad B., Smalley J. S.T., Frateschi N. C., and Fainman Y., "Amorphous Al₂O₃ shield for thermal management in electrically pumped metallo-dielectric nanolasers". *IEEE Journal of Quantum Electronics*, v. PP, p. 1-1, 2014.
- Smalley J. S. T., Vallini F., Kante B., Fainman Y., "Modal amplification in active waveguides with hyperbolic dispersion at telecommunication frequencies". *Optics Express*, v. 22, p. 21088, 2014.
- Barea L. A. M., Vallini F., Jarschel P.F. S., and Frateschi N. C., "Silicon Technology Compatible Photonic Molecules For Compact Optical Signal Processing". *Appl. Phys. Lett.*, v. 103, p. 201102, 2013.
- Barea L. A. M., Vallini F., de Rezende G. F. M., and Frateschi N. C., "Spectral Engineering with CMOS Compatible SOI Photonic Molecules", *IEEE Photonics Journal*, v. 5, p. 1-1, 2013.
- Vallini F., Gu Q., Kats M., Fainman Y., and Frateschi N. C., "Carrier saturation in multiple quantum well metallo-dielectric semiconductor nanolaser: Is bulk material a better choice for gain media?". *Optics Express*, v. 21, p. 25985, 2013.
- Gu Q., Slutsky B., Vallini F., Smalley J. S. T., Nezhad M. P., Frateschi N. C. and Fainman Y., "Purcell effect in sub-wavelength semiconductor lasers". *Optics Express*, v. 21, p. 15603, 2013.
- Fegadolli W. S., Vargas G., Wang X., Vallini F., Barea L. A. M., Oliveira, J. E. B., Frateschi N. C., Scherer A., Almeida V. R., and Panepucci R. R., "Reconfigurable silicon thermo-optical ring resonator switch based on Vernier effect control". *Optics Express*, v. 20, p. 14722, 2012.
- Figueira D. S. L., Barea L. A. M., Vallini F., Jarschel P. F., Lang R., and Frateschi N. C., "a-SiO_x<Er> active photonic crystal resonator membrane fabricated by focused Ga⁺ ion beam". *Optics Express*, v. 20, p. 18772, 2012.
- Vallini F., Barea L. M. A., Reis E. F., Von Zuben A. A. G., and Frateschi N. C., "Induced Optical Losses in Optoelectronic Devices due Focused Ion Beam". *Journal of Integrated Circuits and Systems (Ed. Português)*, v. 7, p. 87-91, 2012.
- Lang, R., Figueira D.S.L., Vallini F., and Frateschi, N. C., "Highly Luminescent a-SiO_x<Er>/SiO₂/Si Multilayer Structure". *IEEE Photonics J.*, v. 4, p. 1-1, 2012.
- da Silva Filho A., Barea L. A. M., Vallini F., Von Zuben A. A. G., and Frateschi N. C., "Mode pattern dependence on the eccentricity of microstadium resonators". *Journal of Applied Physics*, v. 107, p. 083107, 2010.
- Vallini F., Figueira D. S. L., Jarschel P. F., Barea L. A. M., Von Zuben A. A. G., and Frateschi N. C., "Effects of Ga⁺ milling on InGaAsP quantum well laser with mirrors milled by focused ion beam". *Journal of Vacuum Science & Technology. B, Microelectronics and Nanometer Structures Processing, Measurement and Phenomena*, v. 27, p. L25, 2009.
- Barea L. A. M., Vallini F., Vaz A. R., Mialichi J. R., and Frateschi N. C., "Low-roughness active microdisk resonators fabricated by focused ion beam". *Journal of Vacuum Science & Technology. B, Microelectronics and Nanometer Structures Processing, Measurement and Phenomena*, v. 27, p. 2979, 2009.

Selected Conference Papers

- Lin H., Yang M., Sharma R., Puckett M. W., Montoya S., Wurm C., Vallini F., Fullerton E., Fainman Y., "Engineering of a Second-Order Nonlinearity in Silicon-Dielectric Multilayers." In:

CLEO: Science and Innovations, 2016, San Jose. Conference on Lasers and Electro-Optics. Washington: OSA, 2016. p. SF2P.6.

- Sharma R., Puckett M. W., Vallini F., Fainman Y., “Cladding-Dependent Nature of Electro-Optic Effects in Silicon Waveguides.” In: CLEO: Science and Innovations, 2016, San Jose. Conference on Lasers and Electro-Optics. Washington: OSA, 2016. p. STh4E.2.
- Shahin S., Vallini F., Monifi F., Rabinovich M., Fainman Y., “Heteroclinic Dynamics in Photonic Cognitive Motif Network.” In: CLEO: Applications and Technology, 2016, San Jose. Conference on Lasers and Electro-Optics. Washington: OSA, 2016. p. ATu3O.3.
- Puckett M. W., Sharma R., Vallini F., Fainman Y., “Nanoridge Arrays for Integrated and Free-Space Nonlinear Optical Applications.” In: CLEO: Science and Innovations, 2016, San Jose. Conference on Lasers and Electro-Optics. Washington: OSA, 2016. p. SM1E.2.
- Shahin S., Vallini F., Monifi F., Rabinovich M., Fainman Y., “Optical nonlinear dynamics in a system of coupled semiconductor lasers.” In: 2016 IEEE Photonics Society Summer Topical Meeting Series (SUM), 2016, Newport Beach. 2016 IEEE Photonics Society Summer Topical Meeting Series (SUM), 2016. p. 220.
- Vallini F., Shahin S., Monifi F., Smalley J. S. T., Rabinovich M. I., Fainman Y., “Solving optimization problems with coupled dynamical elements.” In: 2016 IEEE Photonics Society Summer Topical Meeting Series (SUM), 2016, Newport Beach. 2016 IEEE Photonics Society Summer Topical Meeting Series (SUM), 2016. p. 46.
- Smalley J. S. T., Vallini F., Montoya S., Ferrari L., Shahin S., Riley C. T., Kante B., Fullerton E. E., Zhaowei L., Fainman Y., “Light-Emitting Hyperbolic Metasurfaces at Telecom Frequencies.” In: Novel Optical Materials and Applications, 2016, Vancouver. Advanced Photonics 2016 (IPR, NOMA, Sensors, Networks, SPCom, SOF). Washington: OSA, 2016. p. NoM3C.3.
- Fainman Y., Puckett M., Sharma R., Smalley J. S. T., Pan S. H., Gu Q., El Amili A., Vallini F., “Nanoscale engineering optical nonlinearities and nanoemitters.” In: 2016 15th Workshop on Information Optics (WIO), 2016, Barcelona. 2016 15th Workshop on Information Optics (WIO), 2016. p. 1.
- Smalley J. S. T., Vallini F., Montoya S., Ferrari L., Shahin S., Riley C. T., Kante B., Fullerton E. E., Zhaowei L., Fainman Y., “Near-infrared meta-gain media based on hyperbolic metasurfaces” (Conference Presentation). In: SPIE Nanoscience + Engineering, 2016, San Diego. p. 992019.
- Smalley J. S. T., Vallini F., Montoya S., Ferrari L., Shahin S., Riley C. T., Kante B., Fullerton E. E., Zhaowei L., Fainman Y., “Fabrication and characterization of InGaAsP/Ag luminescent hyperbolic metamaterials.” In: 2016 31st Symposium on Microelectronics Technology and Devices (SBMicro), 2016, Belo Horizonte. 2016 31st Symposium on Microelectronics Technology and Devices (SBMicro), 2016. p. 1.
- Monifi F., Shahin S., Vallini F., Fainman Y., Rabinovich M. I., “Brain inspired photonic motif networks.” In: 2016 IEEE International Conference on Rebooting Computing (ICRC), 2016, San Diego. 2016 IEEE International Conference on Rebooting Computing (ICRC), 2016. p. 1.
- Smalley J. S. T., Vallini F., Montoya S., Ferrari L., Shahin S., Riley C. T., Kante B., Fullerton E. E., Zhaowei L., Fainman Y., “Active hyperbolic metasurfaces at telecommunication frequencies.” In: 2016 Progress in Electromagnetic Research Symposium (PIERS), 2016, Shanghai. 2016 Progress in Electromagnetic Research Symposium (PIERS), 2016. p. 34.
- Puckett M. W., Vallini F., Grieco A., and Fainman Y., “Multichannel Optical Filters in Nanoscale Silicon Waveguides”, CLEO 2015, PaperSM3I.
- Smalley J. S. T., Vallini F., Kante B., and Fainman Y., “General Conditions for Lossless Propagation in Near-Infrared Hyperbolic Metamaterial Waveguides” CLEO 2015, Paper FM3C.5
- Shane J. C., Gu Q., Vallini F., Wingad B., Smalley J. S. T. Smalley, Frateschi N. C., Fainman Y., “Thermal considerations in electrically-pumped metallo-dielectric nanolasers,” SPIE Photonics West 2014, Paper 8980-82
- Gu Q., Shane J., Vallini F., Wingad B., Smalley J., Frateschi N., and Fainman Y., “Electrically Pumped Metallo-dielectric Pedestal Nanolasers with Amorphous Al₂O₃ Shield”. In: Integrated Photonics Research, Silicon and Nanophotonics, 2014, San Diego. Advanced Photonics for Communications. Washington: OSA, 2014. p. IT5A.2.

- Souza M. C., Barea L. A. M., Vallini F., Rezende G. F. M., Wiederhecker G. S., and Frateschi N. C., “Low-power four-channel wavelength multicasting in embedded microring resonators”. In: CLEO: Science and Innovations, 2014, San Jose. CLEO: 2014. Washington: OSA, 2014. p.
- Gu Q., Shane J., Vallini F., Smalley J. S. T., Frateschi N. C., and Fainman Y., “Electrically pumped metallo-dielectric pedestal nanolasers with high thermal-conductivity shield”. In: 2014 IEEE Photonics Conference (IPC), 2014, San Diego. 2014 IEEE Photonics Conference, 2014. p. 524.
- Barea L. A. M., Vallini F., Rezende G. F. M., and Frateschi N. C., “Compact Photonic Molecules Based on Internally Coupled Microring Resonators”. In: Frontiers in Optics, 2013, Orlando. Frontiers in Optics 2013. Washington: OSA, 2013. p. FTu3A.18.
- Barea L. A. M., Vallini F., Alegre T. P. M., Wiederhecker G. S., Frateschi N. C., “Enhanced Q with Internally Coupled Microring Resonators”. In: CLEO: 2013, 2013, San Jose. SA Technical Digest (online) (Optical Society of America, 2013), 2013.
- Gu Q., Wingad B., Vallini F., Slutsky B., Kats M., Nezhad M. P., Frateschi N. C., and Fainman Y., “Electrically Pumped Metallo-Dielectric Pedestal Nanolasers”. In: Conference on Lasers and Electro-Optics Pacific Rim (CLEO-PR), 2013. Conference on Lasers and Electro-Optics Pacific Rim (CLEO-PR), 2013.
- Vallini F., Gu Q., Wingad B., Slutsky B., Kats M., Fainman Y., and Frateschi N. C., “Geometry Optimization of Nanopatch Semiconductor Lasers: the Trade-off Between Quality Factor and Gain”. In: Latin America Optics and Photonics Conference, 2012, Sao Sebastiao. Latin America Optics and Photonics Conference. Washington: OSA, 2012. p. LT3B.2.
- Barea L. A. M., Vallini F., Figueira D. S. L., Vaz A. R., and Frateschi N. C., “Quantum well microdisk emitters with platinum bridges fabricated by Focused Ion Beam”. In: 2nd International Workshop on FIB for Photonics, 2010, Cambridge. European Conference on Integrated Optics, 2010.
- Figueira D. S. L., Vallini F., Barea L. A. M., and Frateschi N. C., “InGaAsP/InP QW Microdisk Laser Fabricated by Focused Ion Beam”. In: Frontiers in Optics (FiO), 2009, San Jose. Frontier in Optics 2009/Laser Science XXV, 2009.
- Barea L. A. M., Vallini F., Mialichi J. R., Vaz A. R., and Frateschi N. C., “Low-Roughness Active Microdisk Resonators Fabricated Focused Ion Beam (FIB)”. In: EIPBN, 2009, Florida. EIPBN, 2009.