

Mo Li

Associate Professor

Department of Electrical and Computer Engineering
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EDUCATION

Ph.D. Applied Physics	California Institute of Technology	2007
M.S. Physics	University of California, San Diego	2003
B.S. Physics	University of Science and Technology of China	2001

EXPERIENCE

University of Minnesota

Associate Professor with tenure	09/2015-present
Assistant Professor (Tenure Track)	08/2010-08/2015
Department of Electrical and Computer Engineering	
Graduate Faculty, Physics Department	02/2012-present

Yale University

Postdoctoral Associate	10/2007-08/2010
Department of Electrical Engineering, Advisor: Hong Tang	

California Institute of Technology

Postdoctoral Scholar	07/2007-09/2007
Department of Physics, Advisor: Michael Roukes	
Graduate Researcher	07/2003-06/2007
Department of Applied Physics, Advisor: Michael Roukes	

HONORS AND DISTINCTIONS

1. Guillermo E. Borja Career Development Award, University of Minnesota, 2015
2. National Science Foundation (NSF) CAREER Award, 2014
3. McKnight Land-Grant Professorship, University of Minnesota, 2013-2015
4. Young Investigator Award, Air Force Office of Scientific Research (AFOSR), 2012

RESEARCH AREAS

- Nano- and cavity optomechanics (NOMS), nano-electro-mechanical systems (NEMS)
- Nanophotonics, silicon and silicon-based photonics, nonlinear optics
- Mid-infrared photonics
- RF/microwave photonics
- Graphene and 2D material optoelectronics
- Spintronics and optomagnetism
- Chemical and biomedical sensing, nanophotonics for neuro-modulation

SELECTED PUBLICATION

1. Nathan Youngblood, Che Chen, Steven J. Koester, and Mo Li, “Waveguide-integrated black phosphorus photodetector with high responsivity and low dark current”, *Nature Photonics*, **9**, 247 (2014).
2. Huan Li, Mo Li, “Optomechanical photon shuttling between distant photonic cavities”, *Nature Nanotechnology*, **9**, 913 (2014).
3. Semere A. Tadesse, Mo Li, “Sub-optical wavelength acoustic wave modulation of integrated photonic resonators at microwave frequencies”, *Nature Communications*, **5**, 5402 (2014).
4. Huan Li, Yu Chen, Jong Noh, Semere Tadesse, Mo Li, “Multichannel cavity optomechanics for all-optical amplification of radio frequency signals”, *Nature Communications*, **3**, 1091 (2012).
5. Mo Li, E. Myers, H. Tang, J. Aldridge, J. Whiting, R. J. Simonson, H. McCaig, N. S. Lewis, M. L. Roukes, “Nanoelectromechanical resonator arrays for ultrafast, gas-phase chromatographic chemical analysis”, *Nano Letters* **10**, 3899(2010).
6. Mo Li, W. Pernice, H. X. Tang, “Tunable bipolar optical interactions between guided lightwaves”, *Nature Photonics* **3**, 464 (2009).
Featured on Cover. Top 100 stories of 2009 by Discover Magazine. MIT Technology Review Story (July 20th, 2009)
7. Mo Li, W. Pernice, H. X. Tang, “Broadband all-photonic transduction of nanocantilevers”, *Nature Nanotechnology* **4**, 377(2009).
Featured in News and Views in Nature Nanotechnology 4, 344.
8. Mo Li, W. Pernice and H. X. Tang, “Reactive Cavity Optical Force on Micro-disk Coupled Nanomechanical Beam Waveguides”, *Physical Review Letters* **103**, 223901 (2009).
9. Mo Li, W. Pernice, C. Xiong, T. Baehr-Jones, M. Hochberg, H. X. Tang, “Harnessing optical forces in integrated photonic circuits”, *Nature* **456**, 480 (2008).
Featured in Nature News and Views (Nature 456, 480), and in MIT Technology Review story (Dec. 2nd, 2008)
10. Mo Li, H. X. Tang, M. L. Roukes, “Ultrasensitive, NEMS-based cantilevers for sensing, scanned probe, and very high frequency applications”, *Nature Nanotechnology* **2**, 114 (2007).
Featured in News and Views in Nature Nanotechnology 2, 81(2007).

OTHER PUBLICATION

11. Zhu, J., Chen, J.-Y., Park, H., Gu, X., Zhang, H., Karthikeyan, S., Wendel, N., Campbell, S. A., Dawber, M., Du, X., Li, Mo, Wang, J.-P., Yang, R. and Wang, X. "Revealing the Origins of 3D Anisotropic Thermal Conductivities of Black Phosphorus", *Advanced Electronic Materials*, 1600040 (2016)
12. Euijae Shim, Yu Chen, Sotiris Masmanidis, and Mo Li, “Photonic waveguides and grating couplers for high resolution light delivery for optogenetic neuromodulation”,

- Scientific Reports* 6, 22693 (2016).
13. Semere A. Tadesse, Huan Li, Qiyu Liu, Mo Li, "Acousto-optic modulation of a photonic crystal nanocavity with Lamb waves in microwave K band", *Applied Physics Letters*, 107, 201113 (2015).
 14. Li He, Junyang Chen, Jian-Ping Wang, and Mo Li, "All-optical switching of a magnetoresistive device using telecom-band femtosecond laser", *Applied Physics Letters*, 107, 102402 (2015).
 15. Huan Li, Semere A. Tadesse, Qiyu Liu, and Mo Li, "Nanophotonic cavity optomechanics with travelling surface acoustic waves at frequencies up to 12 GHz", *Optica*, in press (2015).
 16. Yu Chen, Mo Li, "Integrated silicon and silicon nitride photonic circuits on flexible substrates", *Optics Letters* 12, 3449 (2014).
 17. Yu Chen, Hongtao Lin, Juejun Hu, Mo Li, "Heterogeneously integrated silicon photonics for the mid-infrared and spectroscopic sensing", *ACS Nano* 8, 6955 (2014) (2014).
 18. Nathan Youngblood, Yoska Anugrah, Rui Ma, Steven J. Koester, Mo Li, "Multifunctional graphene optical modulator and photodetector integrated on silicon waveguides", *Nano Letters* 4, 2741 (2014) (2014).
 19. Li He, Mo Li, "On-chip synthesis of circularly polarized emission of light with integrated photonic circuits", *Optics Letters*, 39, 2553(2014).
 20. Yu Chen, W. Fegadolli, W. Jones, A. Scherer, Mo Li, "Ultrasensitive Gas-Phase Chemical Sensing Based on Functionalized Photonic Crystal Nanobeam Cavities", *ACS Nano* 8, 522 (2014).
 21. S. J. Koester, Mo Li, "Waveguide-Coupled Graphene Optoelectronics", *IEEE Journal of Selected Topics in Quantum Electronics* 20, 6000211 (2014).
 22. Schuck, C., Pernice, W.H.P., Minaeva, O., Mo Li, Gol'tsman, G., Sergienko, A.V., Tang, H.X., "Matrix of Integrated Superconducting Single-Photon Detectors With High Timing Resolution" *IEEE Transactions on Applied Superconductivity*, 23, 2201007 (2013).
 23. Huan Li, J. Noh, Yu Chen, Mo Li, "Enhanced optical forces in integrated hybrid plasmonic waveguides", *Optics Express*, 21, 11839 (2013).
 24. W. Pernice, C. Schuck, O. Minaeva, Mo Li, G. N. Goltsman, A. Sergienko, H. Tang, "High speed travelling wave single-photon detectors with near-unity quantum efficiency", *Nature Communications*, 3, 1325(2012).
 25. Yu Chen, Huan Li, Mo Li, "Flexible and tunable silicon photonic circuits on plastic substrates", *Scientific Reports* 2, 622 (2012).
 26. S. J. Koester, Huan Li, Mo Li, "Switching energy limits of waveguide-coupled graphene-on-graphene optical modulators", *Optics Express* 20, 20330 (2012)
 27. Huan Li, Yoska Anugrah, S. J. Koester, Mo Li, "Optical absorption in graphene integrated on silicon waveguides", *Applied Physics Letters*, accepted (2012).

28. S. J. Koester, Mo Li, "High-speed waveguide-coupled graphene-on-graphene optical modulators", *Applied Physics Letters*, **100**, 171107 (2012).
29. M. Bagheri, M. Poot, Mo Li, W. Pernice, H. Tang "Dynamic manipulation of mechanical resonators in the high amplitude regime through optical backaction", *Nature Nanotechnology*, advance online publication (2011).
Featured in News and Views, Nature Nanotechnology 6, 690 (2011), Science Magazine News (Oct. 23rd, 2011), IEEE Spectrum Magazine (Oct. 24th, 2011).
30. K. Y. Fong, W. Pernice, Mo Li, H. Tang, "Tunable optical coupler controlled by optomechanical interactions", *Optics Express*, **19**, 15098(2011).
31. W. Pernice, C. Schuck, Mo Li, H. Tang "Carrier and thermal dynamics of silicon photonic resonators at cryogenic temperatures", *Optics Express*, **19**, 3290(2011).
32. H. Bhaskaran, Mo Li, D. Garcia-Sanchez, P. Zhao, I. Takeuchi, H. Tang "Active microcantilevers based on piezoresistive ferromagnetic thin films", *Applied Physics Letters* **98**, 013502 (2010).
33. Mo Li, W. Pernice, H. Tang, "Ultrahigh-Frequency Nano-Optomechanical Resonators in Slot Waveguide Ring Cavities", *Applied Physics Letters* **97**, 183118 (2010).
34. C. Xiong, W. Pernice, Mo Li and H. Tang, "High performance nanophotonic circuits based on partially buried horizontal slot waveguides", *Optics Express*, **18**, 20690 (2010).
35. K. Fong, W. Pernice, Mo Li and H. Tang, "High Q optomechanical resonators in silicon nitride nanophotonic circuits", *Applied Physics Letters* **97**, 073112 (2010).
36. W. Pernice, Mo Li and H. X. Tang, "Time-domain measurement of optical transport in silicon micro-ring resonatorss", *Optics Express* **18**, 18438 (2010).
37. C. Xiong, W. Pernice, Mo Li, M. Rooks, H. X. Tang, "Adiabatic embedment of nanomechanical resonators in photonic microring cavities", *Applied Physics Letters*, accepted (2010).
38. W. Pernice, Mo Li, D. Garcia-Sanchez, and H. X. Tang, "Analysis of short range forces in opto-mechanical devices with a nanogap", *Optics Express* **18**, 12615 (2010).
39. W. Pernice, Mo Li, D.F.G. Gallagher and H X. Tang, "Silicon Ntride membrane photonics", *Journal of Optics A* **11**, 114017 (2009).
40. W. Pernice, Mo Li, H. X. Tang, "A mechanical Kerr effect induced by deformable photonic media", *Applied Physics Letters* **95**, 123507 (2009).
41. W. Pernice, Mo Li, K.Y. Fong and H. X. Tang, "Modeling of optical forces between propagating lightwaves in parallel 3D waveguides", *Optics Express* **17**, 16032 (2009).
42. W. Pernice, Mo Li, H. X. Tang, "Optomechanical coupling in photonic crystal supported nanomechanical waveguides", *Optics Express* **17**, 012424 (2009).
43. W. Pernice, Mo Li, H. X. Tang, "Theoretical investigation of the transverse optical force between a silicon nano-wire and a substrate", *Optics Express* **17**, 1806 (2009).
44. W. Pernice, Mo Li, H. X. Tang, "Photothermal effects in nanomechanical waveguide devices", *Journal of Applied Physics* **105**, 014508 (2009).

45. W. Pernice, Mo Li, H. X. Tang, “GHz photothermal effect in silicon photonic waveguide”, *Applied Physics Letters* 93, 213106 (2008).
46. S. C. Masmanidis, H. X. Tang, E. B. Myers, Mo Li, K. De Greve, G. Vermeulen, W. Van Roy, M. L. Roukes, “Nanomechanical Measurement of Magnetostriction and Magnetic Anisotropy in (Ga,Mn)As”, *Physical Review Letters* 95, 187206 (2005).

PROFESSIONAL SERVICES

1. Associate Editor, Optics Express, OSA, since 2015
2. Chair, Symposium on Optomechanics, IEEE Photonics Conference 2014.
3. Program subcommittee member, Quantum Electronics, OSA FiO 2014.
4. Chair, Topical Meeting on “Non-reciprocal Photonic Devices”, IEEE Photonics Society Summer Topicals, Hawaii, July 2013
5. Topic Committee member, Photonic Materials Science and Technology (PMST), IEEE Photonics Conference 2012
6. Panel Reviewer of NSF, ECCS division, EPMD program; CMMI division, SSS program; CBET division, biophotonics program.
7. **Journal Reviewer of** *Nature Photonics*, *Nature Communications*, *Scientific Reports*, *Applied Physics Letters*, *Journal of Applied Physics*, *Optics Letters*, *Optics Express*, *Nano Letters*, *ACS Nano*, *ACS Photonics*, *New Journal of Physics*, *Journal of the Optical Society of American B*, *IEEE Photonics Journal*, *Sensors and Actuators A*, *Nanoscale*, *AIP Advance*

INVITED TALKS AND COLLOQUIA

1. IEEE Optical MEMS and Nanophotonics Conference, Singapore, Aug. 2016
2. SPIE Defense and Commercial Sensing, Baltimore, Apr. 2016
3. Quantum and Nano Control Workshop, Institute of Mathematical Applications (IMA), University of Minnesota, Apr. 2016
4. Laboratory of Physical Science (LPS), University of Maryland, College Park, Feb. 2016
5. NSF-MOST Bilateral Photonics Workshop, Taipei, Taiwan, May 2015
6. Department of Electrical and Computer Engineering, University of Wisconsin, Madison, Nov. 2014
7. Department of Material Science and Engineering, University of Pennsylvania, Nov. 2014
8. Department of Mechanical Engineering, University of Colorado, Boulder, Oct. 2014
9. School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, July 2014

10. IEEE Photonics Society, Summer Topicals Meeting, Montreal, July 2014
11. Institute of Nanotechnology, Karlsruhe Institute of Technology, Germany, Nov. 2013
12. Center for Nanotechnology, University of Washington, May 2013
13. MRS Spring Meetings, San Francisco, April 2013
14. Center for Nanostructure Application (CNA), University of Minnesota, Sept, 2012
15. CMOS Emerging Technology 2012, Vancouver, Canada, July 2012
16. University of Delaware, Department of Material Science and Engineering, Mar. 2012
17. SPIE Photonics West Conference, San Francisco, Jan. 2012
18. University of Minnesota, Department of Physics, Condensed Matter Physics Seminar, Oct. 2011
19. University of Minnesota, Department of ECE, Department Colloquium, October 2010
20. Optical Society of American (OSA), Minnesota Sector, September 2010

TEACHING

Undergraduate Level

EE 2011: Linear System and Circuits, Spring 2012

EE 3601: Transmission Lines, Fields, and Waves, Spring 2013, Spring 2014

Graduate Level

EE 5624: Optical Electronics, Fall 2010, Fall 2011, Fall 2012, Fall 2013

CURRENT STUDENTS

Ph.D Students:

1. Nathan Youngblood, ECE Department, 2012-present
2. Li He, ECE Department, 2013-present
3. Che Chen, ECE Department, 2014-present
4. Euijae Shim, ECE Department, 2014-present
5. Qiyu Liu, ECE Department, 2014-present
6. Ruoming Peng, ECE Department, 2015-present
7. Bingzhao Li, ECE Department, 2015-present

Post-doc:

1. Junyang Chen, ECE Department, 2014-present
2. Huan Li, ECE Department, 2015- present

PAST STUDENTS

1. **Yu Chen**, Ph.D. 2014
 Dissertation: High quality silicon photonic devices based on heterogeneous integration method
 Position after graduation: Science Advisor, RKMC LLP, Minneapolis
2. **Huan Li**, Ph.D. 2015

Dissertation: Multifunctional optomechanical dynamics in integrated silicon photonics

Position after graduation: Postdoc Researcher, University of Minnesota

3. Semere Tadesse, Ph.D. 2016

Dissertation: Nano-optomechanical System Based On Microwave Frequency Surface Acoustic Waves

Current Position: Integration Engineer, Intel Corp.