Amir Arbabi

211C Knowles Engineering Bldg
University of Massachusetts
151 Holdsworth Way, Amherst, MA 01003

phone: (413) 545-6193
e-mail: arbabi@umass.edu

Education

2009–2013	**University of Illinois at Urbana-Champaign** Ph.D. in Electrical Engineering
2007–2009	**University of Waterloo** M.Sc. in Electrical Engineering
2002–2006	**University of Tehran** B.Sc. in Electrical Engineering

Professional History

2017–	**University of Massachusetts Amherst** Assistant Professor of Electrical and Computer Engineering
2013–2016	**California Institute of Technology** T. J. Watson Laboratories of Applied Physics Postdoctoral Scholar (2013–2014), and Senior Research Scientist (2014–2016)

Research Interests

Experimental and theoretical aspects of nanophotonics, flat optics, and photonic integrated circuits with applications in optical data processing, sensors, consumer electronics, optical communications, and imaging.

Honors & Distinctions

- K. C. Yeh Endowed Fellowship of ECE Illinois, 2013.
- Nick and Katherine Holonyak, Jr. Graduate Student Fellowship, 2012.
- Nick and Katherine Holonyak, Jr. Outstanding Research Award, 2012.
- E. A. Reid Fellowship Award of ECE Illinois, 2011.
- Finalist of the Jean Bennett Memorial Award of the Frontiers in Optics conference, 2010.
- "Ontario Graduate Scholarship" ($30,000) and "President's Graduate Scholarship" ($20,000). Awarded by the government of Ontario and the University of Waterloo for recognition of academic excellence in graduate studies, 2008 & 2009.
- Ranked 1st among ∼750 graduates of the College of Engineering, University of Tehran, 2002–2006.
- Ranked 1st in the first stage, and 2nd in the final stage of the 10th Iranian National Electrical Engineering Olympiad among more than 11,000 electrical engineering students, 2005.
- Faculty of Engineering award for the highest annual GPA in the School of ECE, University of Tehran, for four consecutive years, 2002–2006.
- Silver medal in the 14th Iranian National Physics Olympiad, 2001.

Publications, Talks, & Patents

Journals

[J1] E. Miyazono, I. Craiciu, A. Arbabi, T. Zhong, and A. Faraon, "Coupling erbium dopants in yttrium orthosilicate to silicon photonic resonators and waveguides," *Opt. Express*, vol. 25, pp. 2863–2871, 2017.

[J2] E. Arbabi, A. Arbabi, S. M. Kamali, Y. Horie, and A. Faraon, "Controlling the sign of chromatic dispersion in diffractive optics," arXiv preprint arXiv:1701.07178, 2017.

[J3] A. Arbabi, and A. Faraon, "Fundamental limits of ultrathin metasurfaces," *Sci. Rep.*, vol. 7, 43722, 2017.

[J4] A. Arbabi, E. Arbabi, S. M. Kamali, Y. Horie, S. Han, and A. Faraon "Miniature optical planar camera based on a wide-angle metasurface doublet corrected for monochromatic aberrations," *Nat. Commun.*, vol. 7, 13682, 2016.

[J5] S. M. Kamali, E. Arbabi, A. Arbabi, Y. Horie, and A. Faraon, "Highly tunable elastic dielectric metasurface lenses," *Laser Photon. Rev.*, vol. 10, pp. 1002–1008, 2016.

[J6] E. Arbabi, A. Arbabi, S. M. Kamali, Y. Horie, and A. Faraon, "Multiwavelength metasurfaces through spatial multiplexing," *Sci. Rep.*, vol. 6, 32803, 2016.

[J7] Y. Ren, L. Li, Z. Wang, S. M. Kamali, E. Arbabi, A. Arbabi, Z. Zhao, G. Xie, Y. Cao, N. Ahmed, Y. Yan, C. Liu, A. J. Willner, S. Ashrafi, M. Tur, A. Faraon, A. E. Willner "Orbital angular momentum-based space division multiplexing for high-capacity underwater optical communications," *Sci. Rep.* 6, 33306, 2016.

[J8] E. Arbabi, A. Arbabi, S. M. Kamali, Y. Horie, A. Faraon, "High efficiency double-wavelength dielectric metasurface lenses with dichroic birefringent meta-atoms," *Opt. Express*, vol. 24, pp. 18468–18477, 2016.

[J9] Y. Horie, A. Arbabi, E. Arbabi, S. M. Kamali, and A. Faraon, "Wide bandwidth and high resolution planar filter array based on DBR-metasurface-DBR structures," *Opt. Express*, vol. 24, pp. 11677–11682, 2016.

[J10] A. Faraon, A. Arbabi, Y. Horie, E. Arbabi, and S. M. Kamali "Flat free-space optical elements based on dielectric metasurfaces," *SPIE Newsroom*, April 2016, doi: 10.1117/2.1201603.006375.

[J11] E. Arbabi, A. Arbabi, S. M. Kamali, Y. Horie, and A. Faraon "Multiwavelength polarization insensitive lenses based on dielectric metasurfaces with meta-molecules," *Optica*, vol. 3, pp. 628-633, 2016.

[J12] M. P. Backlund, A. Arbabi, P. N. Petrov, E. Arbabi, S. Saurabh, A. Faraon, and W. E. Moerner, "Removing orientation-induced localization biases in single molecule microscopy using a wideband metasurface mask," *Nature Photon.*, vol. 10, pp. 459–462, 2016.

[J13] S. M. Kamali, A. Arbabi, E. Arbabi, Y. Horie, and A. Faraon, "Decoupling optical function and geometrical form using conformal flexible dielectric metasurfaces," *Nat. Commun.*, vol. 7, 2016.

[J14] A. Arbabi, R. Briggs, Y. Horie, M. Bagheri, and A. Faraon, "Efficient dielectric metasurface collimating lenses for mid-infrared quantum cascade lasers," *Opt. Express*, Vol. 23, No. 26, 2015.

[J15] Y. Horie, A. Arbabi, S. Han, and A. Faraon, "High resolution on-chip optical filter array based on double subwavelength grating reflectors," *Opt. Express*, Vol. 23, No. 23, pp. 29848–29854, 2015.

[J16] A. Arbabi, M. Bagheri, Y. Horie, and A. Faraon, "Dielectric metasurfaces for complete control of phase and polarization with subwavelength spatial resolution and high transmission," *Nature Nanotech.*, Vol. 10, pp. 937–943, 2015. **Featured in numerous media outlets including IEEE Spectrum, Phys.org, ScienceDaily NASA.gov, ACM News, Caltech News Scitech Daily, Nanowerk, The Epoch Times, Gizmag, Space.com, etc., and in the *News and Views* article by R. Zia, "Dielectric metasurfaces: transparent design," *Nature Nanotech.*, vol. 10 , pp. 913–914, 2015.**

[J17] C. Edwards, A. Arbabi, B. Bhaduri, X. Wang, R. Ganti, P. J. Yunker, A. G. Yodh, G. Popescu, and L. L. Goddard, "Measuring the non-uniform evaporation dynamics of sprayed sessile microdroplets with quantitative phase imaging," *Langmuir*, Vol. 31, No. 40, pp. 11020–11032, 2015.

[J18] A. Arbabi, M. Bagheri, A. J. Ball, Y. Horie, and A. Faraon, "Subwavelength-thick lenses with high numerical apertures and large efficiency based on high-contrast transmitarrays," *Nat. Commun.*, Vol. 6, 7069, 2015. **Featured in BBC News and BBC Click program:** `http://www.bbc.com/news/technology-34210347`**, and numerous media outlets including Yahoo News, Laser Focus World, Phys.org, Caltech News, Futurity, etc.**

[J19] A. Arbabi, S. M. Kamali, E. Arbabi, B. G. Griffin, and L. L. Goddard, "Grating integrated single mode microring laser," *Opt. Express*, Vol. 23, No. 4, pp. 5335–5347, 2015.

[J20] Y. M. Kang, M. Xue, A. Arbabi, J. Jin, L. L. Goddard, "Modal expansion approach for accurately computing resonant modes in a high-Q optical resonator," *Microw. Opt. Technol. Lett.*, Vol. 56, No. 2, pp. 278–284, 2014.

[J21] M. Xue, Y. M. Kang, A. Arbabi, S. J. McKeown, L. L. Goddard, and J. Jin, "Fast and accurate finite element analysis of large-scale three-dimensional photonic devices with a robust domain decomposition method," *Opt. Express*, Vol. 22, No. 4, pp. 4437–4452, 2014.

[J22] A. Arbabi, and L. L. Goddard, "Measurements of the refractive indices and thermo-optic coefficients of Si_3N_4 and SiO_x using microring resonances," *Opt. Lett.*, Vol. 38, No. 19, pp. 3878–3881, 2013.

[J23] R. Zhou, C. Edwards, A. Arbabi, G. Popescu, and L. L. Goddard, "Detecting 20 nm defects in large area nano-patterns using interferometric microscopy," *Nano Lett.*, Vol. 13, No. 8, pp. 3716–3721, 2013.

[J24] B. G. Griffin, A. Arbabi, L. L. Goddard, "Engineering the sensitivity and response time of edge-emitting laser hydrogen sensors," *IEEE Sens. J.*, Vol. 13, No. 8, pp. 3098-3105, 2013.

[J25] B. G. Griffin, A. Arbabi, M. P. Tan, A. M. Kasten, K. D. Choquette, and L. L. Goddard, "Demonstration of enhanced side mode suppression in metal filled photonic crystal vertical cavity lasers," *Opt. Lett.*, Vol. 38, No. 11, pp. 1936–1938, 2013.

[J26] A. Arbabi and L. L. Goddard, "Dynamics of self-heating in microring resonators," *IEEE Photon. J.*, Vol. 4, No. 5, pp. 1702–1711, 2012.

[J27] A. Arbabi and L. L. Goddard, "Integrated optical resonators: progress in 2011," (invited) *IEEE Photon. J.*, Vol. 4, No. 2, pp. 574–577, 2012.

[J28] C. Edwards, A. Arbabi, G. Popescu, and L. L. Goddard, "Optically monitoring and controlling nanoscale topography during semiconductor etching," *Light Sci. Appl.*, Vol. 1, No. 9, 2012. **Featured on NSF homepage, ScienceDaily, Compound Semiconductor, Illinois News, and in the news article "Semiconductor etching monitored in real time," *Photonics Spectra Magazine*, Dec. 2012.**

[J29] B. G. Griffin, A. Arbabi, A. Kasten, K. Choquette, and L. L. Goddard, "Hydrogen detection using a functionalized photonic crystal vertical cavity laser," (invited) *IEEE J. Quantum Electron.*, Vol. 48, No. 2, pp. 160–168, 2012.

[J30] A. Arbabi and S. Safavi-Naeini, "Maximum gain of a lossy antenna," *IEEE Trans. Antennas and Propag.*, Vol. 60, No. 1, pp. 2–7, 2012.

[J31] A. Arbabi, Y. M. Kang, C. Lu, E. Chow, and L. L. Goddard, "Realization of a narrowband single wavelength microring mirror," *Appl. Phys. Lett.*, Vol. 99, No. 9, 2011. **Featured in the news article "Improving lasers with microring mirrors" by M. Marquit for Phys.org.**

[J32] A. Arbabi, Y. M. Kang, and L. L. Goddard, "Cylindrical coordinates coupled mode theory," *IEEE J. Quantum Electron.*, Vol. 46, No. 12, pp. 1769–1774, 2010.

[J33] A. Arbabi, E. Arbabi, and S. Safavi-Naeini, "A fundamental limit on subwavelength guided waves," *Progress In Electromagnetic Research M*, Vol. 17, pp. 253–265, 2011.

[J34] Y. M. Kang, A. Arbabi, and L. L. Goddard, "Engineering the spectral reflectance of microring resonators with integrated reflective elements," *Opt. Express*, Vol. 18, No. 16, pp. 16813–16825, 2010.

[J35] Y. M. Kang, A. Arbabi, and L. L. Goddard, "A microring resonator with an integrated Bragg grating: a compact replacement for a sampled grating distributed Bragg reflector," *Opt. Quantum Electron.*, Vol. 41, No. 9, pp. 689–697, 2009.

Conferences

[C1] A. Arbabi, E. Arbabi, S. M. Kamali, Y. Horie, S. Han, and A. Faraon, "Increasing efficiency of high-NA metasurface lenses," *SPIE Photonics West*, 2017.

[C2] E. Arbabi, A. Arbabi, S. M. Kamali, Y. Horie, and A. Faraon, "Independent control of function and chromatic dispersion in diffractive optical devices with metasurfaces," *SPIE Photonics West*, 2017.

[C3] S. M. Kamali, E. Arbabi, A. Arbabi, Y. Horie, and A. Faraon, "Metasurfaces with controlled angular phase dispersion," *SPIE Photonics West*, 2017.

[C4] S. M. Kamali, E. Arbabi, A. Arbabi, Y. Horie, and A. Faraon, "Conformal and tunable optical dielectric metasurfaces based on flexible stretchable substrates," *IEEE Photonics Conference*, 2016.

[C5] N. Davoudzadeh, A. Arbabi, and L. L. Goddard, "Thermal nonlinearity based optical pulse generation in microrings," *Progress in Electromagnetic Research Symposium*, 2016.

[C6] A. Arbabi, E. Arbabi, Y. Horie, S. M. Kamali, S. Han, and A. Faraon, "Aberration corrected metasurface doublet lens," *Conference on Lasers and Electro-Optics (CLEO)*, 2016.

[C7] Y. Horie, A. Arbabi, E. Arbabi, S. M. Kamali, and A. Faraon, "Dielectric metasurface narrowband filter array," *Conference on Lasers and Electro-Optics (CLEO)*, 2016.

[C8] Y. Horie, A. Arbabi, E. Arbabi, S. M. Kamali, and A. Faraon, "Active dielectric antenna for phase only spatial light modulation," *Conference on Lasers and Electro-Optics (CLEO)*, 2016.

[C9] S. M. Kamali, E. Arbabi, A. Arbabi, Y. Horie, and A. Faraon, "Tunable dielectric metasurfaces using elastic substrates," *Conference on Lasers and Electro-Optics (CLEO)*, 2016.

[C10] E. Arbabi, A. Arbabi, S. M. Kamali, Y. Horie, and A. Faraon, "Dispersionless metasurfaces using dispersive meta-atoms," *Conference on Lasers and Electro-Optics (CLEO)*, 2016.

[C11] N. Davoudzadeh, A. Arbabi, J. Zhu, and L. L. Goddard "Optical clock pulse generation using thermal nonlinearity in microring resonators," *Conference on Lasers and Electro-Optics (CLEO)*, 2016.

[C12] Z. Wang, Y. Yan, A. Arbabi, C. Liu, G. Xie, Y. Ren, Z. Zhao, L. Li, N. Ahmed, A. J. Willner, E. Arbabi, A. Faraon, N. Ashrafi, S. Ashrafi, R. D. Linquist, M. Tur, and A. E. Willner, "Demonstration of using passive integrated phase masks to generate orbital-angular-momentum beams in a communications link," *Conference on Lasers and Electro-Optics (CLEO)*, 2016.

[C13] A. Arbabi, E. Arbabi, Y. Horie, S. M. Kamali, and A. Faraon, "Experimental demonstration of a metasurface planar retroreflector," *SPIE Photonics West*, 2016.

[C14] E. Arbabi, A. Arbabi, S. M. Kamali, Y. Horie, A. Faraon, "Polarization insensitive multi-wavelength metasurface lens," *SPIE Photonics West*, 2016.

[C15] S. M. Kamali, A. Arbabi, E. Arbabi, Y. Horie, and A. Faraon "Dielectric metasurfaces on thin flexible substrates," *SPIE Photonics West*, 2016.

[C16] S. Han, Y. Horie, C. Shin, A. Arbabi, E. Arbabi, S. Hwang, and A. Faraon "Dielectric metasurface filters for backside illuminated CMOS image sensors," *MRS Spring Meeting*, 2016.

[C17] A. Arbabi, Y. Horie, M. Bagheri, and A. Faraon, "Simultaneous and complete control of light polarization and phase using high contrast transmitarrays," *Conference on Lasers and Electro-Optics (CLEO)*, 2015.

[C18] A. Arbabi, Y. Horie, M. Bagheri, and A. Faraon, "Highly efficient polarization control using subwavelength high contrast transmitarrays," in *Proc. SPIE*, San Francisco, CA, USA, 2015.

[C19] A. Arbabi, Y. Horie, A. J. Ball, M. Bagheri, and A. Faraon, "Efficient high NA flat micro-lenses realized using high contrast transmitarrays," *SPIE Photonics West*, 2015.

[C20] Y. Horie, A. Arbabi, and A. Faraon, "On-chip broadband spectral fltering using planar double high-contrast grating reflectors," *SPIE Photonics West*, 2015.

[C21] Y. Horie, A. Arbabi, and A. Faraon, "Guided resonance reflective phase shifters," *SPIE Photonics West*, 2015.

[C22] C. Edwards, A. Arbabi, B. Bhaduri, R. Ganti, P. J. Yunker, G. Yodh, G. Popsecu, and L. L. Goddard, "Characterizing microdroplet evaporation using diffraction phase microscopy," *IEEE Photonics Conference*, 2014.

[C23] A. Arbabi, M. Bagheri; A. J. Ball, Y. Horie, D. Fattal, and A. Faraon, "Controlling the phase front of optical fiber beams using high contrast metastructures," *Conference on Lasers and Electro-Optics (CLEO)*, 2014.

[C24] A. Arbabi, and A. Faraon, "Planar retroreflector," *Conference on Lasers and Electro-Optics (CLEO)*, 2014.

[C25] Yu Horie, A. Arbabi, and A. Faraon, "Reflective optical phase modulator based on high-contrast grating mirrors," *Conference on Lasers and Electro-Optics (CLEO)*, 2014.

[C26] A. Arbabi, and L. L. Goddard, "Single wavelength microring laser," *Conference on Lasers and Electro-Optics (CLEO)*, 2013.

[C27] A. Arbabi, and L. L. Goddard, "Grating assisted mode coupling in microring resonators," (invited) *IEEE Photonics Conference*, 2013.

[C28] A. Arbabi, B. G. Griffin, and L. L. Goddard, "An active-passive monolithic integration platform with low loss passive section," *IEEE Photonics Conference*, 2013.

[C29] B. G. Griffin, A. Arbabi, and L. L. Goddard, "Functionalized distributed feedback lasers for hydrogen sensing applications," *IEEE Photonics Conference*, 2013.

[C30] A. Arbabi, and L. L. Goddard, "Determination of waveguide core and cladding refractive indices using single wavelength microring reflectors," *IEEE Photonics Conference*, 2012.

[C31] Y. M. Kang, A. Arbabi, and L. L. Goddard, "Resolving split resonant modes in microrings," *IEEE Photonics Conference*, 2012.

[C32] A. Arbabi, P. Lu, B. G. Griffin, and L. L. Goddard, "Thermally-induced nonlinearity and optical bistability in Si_3N_4 microring resonators," *Conference on Lasers and Electro-Optics (CLEO)*, 2012.

[C33] M. Raval, S. McKeown, A. Arbabi, and L. L. Goddard, "Palladium based Fabry-Pérot etalons for hydrogen sensing," *Optical Sensors*, 2012.

[C34] B. Griffin, A. Arbabi, and L. L. Goddard, "Coupled mode analysis of a distributed Bragg reflector laser for hydrogen detection," *Optical Sensors*, 2012.

[C35] B. G. Griffin, A. Arbabi, and L. L. Goddard, "Mode suppression in metal filled photonic crystal vertical cavity lasers," *SPIE Photonics West*, 2012.

[C36] A. Arbabi, Y. M. Kang, and L. L. Goddard, "Realization of small footprint microring reflectors," i*Conference on Lasers and Electro-Optics (CLEO)*, 2011.

[C37] A. Arbabi, Y. M. Kang, and L. L. Goddard, "Analysis and design of a microring inline single wavelength reflector," *Frontiers in Optics (FiO)*, 2010.

[C38] B. G. Griffin, C. Chang, A. Arbabi, and L. L. Goddard, "Pd coated Edge-emitting lasers for hydrogen sensing applications," *IEEE Sensors Conference*, 2010.

[C39] A. Arbabi, A. Rohani, D. Saeedkia, and S. Safavi-Naeini, "A terahertz plasmonic metamaterial structure for near-field sensing applications," *Int. Conf. Infrared and Millimeter Waves (IRMMW-THz)*, 2008.

[C40] A. Arbabi, "Slotted ground microsrip line," *UTECE Symposium 2005*, Tehran, March 2005. Was awarded the **Best Paper Award**.

[C41] A. Arbabi, A. Boutejdar, M. Mahmoudi and A. S. Omar, "Increase of characteristic impedance of microstrip line using a simple slot in metallic ground plane," *Int. Conf. Commun. Electron. (ICCE'06)*, 2006.

Invited Talks and Seminars

[T1] Planar optical components and systems based on dielectric metasurfaces. SPIE Photonics West, Feb. 2017.

[T2] Flat and conformal optics with dielectric metasurfaces. 5th International Conference on Lasers, Optics & Photonics, Nov. 2016.

[T3] Planar free-space optical components and systems based on dielectric metasurfaces. EE Department, Sharif University of Technology, July 2016.

[T4] Planar free-space optical components and systems based on dielectric metasurfaces. ECE Department, University of Tehran, July 2016.

[T5] Planar optical components and systems based on dielectric metasurfaces. ECE Department Seminar, University of Massachusetts Amherst, April 2016.

[T6] Flat optics with dielectric metasurfaces. Invited talk at SPIE Micro- and Nanotechnology Sensors, Systems, and Applications VIII, April 2016.

[T7] Planar optical components and systems based on dielectric metasurfaces. ECE Department Seminar, University of Alberta, April 2016.

[T8] Planar free-space optical components and systems based on dielectric metasurfaces. Colloquium, Institute of Optics, University of Rochester, March 2016.

[T9] Planar free-space optical components and systems based on dielectric metasurfaces. Graduate Seminar, Department of Electrical and Electronic Engineering, Nanyang Technological University, March 2016.

[T10] Planar free-space optical components and systems based on dielectric metasurfaces. ECE Graduate Seminar, University of Pittsburgh, Feb. 2016.

[T11] Planar free-space optical components and systems based on dielectric metasurfaces. ESE Department Seminar, Washington University in St. Louis, Jan. 2016.

[T12] Optical components thinner than a wavelength and their application for microscopy. 11th Annual Advanced Imaging Methods (AIM) Workshop, UC Berkeley, Feb. 2015.

[T13] Micron-thick optical devices for microscopy. Medical Eng. Industry Day 2014, Caltech 2014.

[T14] Micron-thick efficient optical components. APhMS in the 21st Century, Caltech Nov. 2014.

[T15] Shaping beam profile of optical fibers using planar high contrast structures. 2014 Frontiers of Nano Science and Technology Conference, Caltech Jan. 2014.

[T16] Optimum phase mask design and implementation for coupling light between two waveguides. KNI-MDL Seminar, Caltech Dec. 2013.

[T17] Reflective microring resonators: compact narrow-band reflectors for photonic integrated circuits. Applied Physics Seminar, Caltech, March 2013.

[T18] Selective mode coupling in microring resonators. CNST Nanotechnology Workshop 2013, University of Illinois at Urbana-Champaign, May 2013.

[T19] Reflective microring resonators: compact narrow-band reflectors for photonic integrated circuits. Nanohour Seminar, University of Illinois at Urbana-Champaign, Nov. 2011.

Patents

[P1] A. Arbabi, L. C. Ding, E. Arbabi, and A. Faraon "Incoherent holographic imaging with metasurfaces," filed Oct. 2016.

[P2] E. Arbabi, A. Arbabi, S.M. Kamali, Y. Horie, and A. Faraon, "Dispersionless optical dielectric metasurfaces," filed Jan. 2016.

[P3] A. Arbabi, A. Faraon, and S. Han, "Imaging with a monolithic array of metasurface lenses," filed July 2015.

[P4] A. Faraon, and A. Arbabi, “Planar diffractive device with diffraction spectrum matched to a specific target spectrum,” filed July 2015.

[P5] A. Arbabi, E. Arbabi, S. Han, and A. Faraon, “Compact planar metasurface spectrometer,” filed July 2015.

[P6] S. Han, Y. Horie, A. Arbabi, S. M. Kamali, A. Faraon, S. Hwang, and Y. Kim, “Fabrication of high index Si nanostructure filters on BIS Si photodiodes,” filed July 2015.

[P7] E. Arbabi, A. Arbabi, and A. Faraon, “Multi-wavelength optical dielectric metasurfaces,” filed Apr. 2015.

[P8] S. M. Kamali, E. Arbabi, A. Arbabi, and A. Faraon, “Conformal optical metasurfaces,” filed Apr. 2015.

[P9] A. Arbabi, A. Faraon, and S. Han, “Aberration corrected planar metasurface doublet lenses,” filed Apr. 2015.

[P10] S. Han, A. Arbabi, S. Hwang, A. Faraon, B. L. Choi, and J. You, “Thin-imaging optics using nanostructured thin-lenses for optical and image sensor applications,” filed Apr. 2015.

[P11] A. Arbabi, and A. Faraon, “Simultaneous polarization and wavefront control using a planar device,” filed Sept. 2014.

[P12] Y. Horie, A. Arbabi, and A. Faraon, “Optical phased array using guided resonance with backside reflectors,” filed July 2014.

[P13] Y. Horie, A. Arbabi, and A. Faraon, “Optical shutter based on MEMS actuated sub-wavelength gratings,” filed July 2014.

[P14] A. Arbabi, and A. Faraon, “Controllable planar optical focusing system,” filed Apr. 2014, US Patent 20,150,219,806, 2015.

[P15] A. Arbabi, and A. Faraon, “Flat retroreflectors,” filed Dec. 2013, US Patent 20,150,160,384, 2015.

[P16] G. Popescu, L. L. Goddard, C. Edwards, and A. Arbabi, “Optically monitoring and controlling nanoscale topography,” Patent No. US 9,255,791 filed Sept. 2012, issued Feb. 2016.

[P17] L. L. Goddard, Y. M. Kang, and A. Arbabi, “Distributed Bragg reflector in a microring resonator,” Patent No. US 8,670,476 filed Sept. 2011, issued March 2014.