

Pouya Dianat, PhD

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EDUCATION

Drexel University , Ph.D in Electrical & Computer Engineering, Philadelphia PA	Feb 2015
Drexel University , M.Sc in Electrical & Computer Engineering, Philadelphia PA	Jun 2010
Sharif University of Technology , B.Sc in Electrical Engineering, Tehran, Iran	Jun 2007

PROFESSIONAL EXPERIENCE

Nanograss Solar LLC, Chief Scientific Officer , Philadelphia, PA	2017 - present
<ul style="list-style-type: none">• Developing a family of opto-plasmonic devices for computation and Si photonics• Identifying customer needs and establishing relationship with them• Securing capital from various investment venues including angel investors and venture capitalists• Providing the technical supports needed for start-up through seed grants• Composing Small Business Innovative Research (SBIR) proposals for R&D funding	
Drexel University, Adjunct Faculty , Philadelphia, PA	2017 - present
<ul style="list-style-type: none">• Advising graduate students on PhD dissertation and research projects• Instructing senior level courses on advanced electronics topics• Developing new special topics course on Quantum Computation• Crafting grant research proposals for National Science Foundation and Department of Defense	
Northwestern University, Postdoctoral Fellow , Evanston, IL	2015 - 2017
<ul style="list-style-type: none">• Authored and managed grant portfolio for development of low-cost infrared cameras (>\$1.5M, DoD)• Developed a novel manufacturing of thermal imagers, addressing a major production yield problem (3 publications)• Directed a team (of 3) scientists on strategy and execution of a research project, resulting in new technology adaptation• Analyzed technical contents and provided a roadmap on appropriation of lab resources for >15 research projects	
Drexel University, Graduate Research Fellow , Philadelphia, PA	2007 - 2015
<ul style="list-style-type: none">• Championed patent acquisition and commercialization efforts for a start-up company (1 pending patent)• Created a class of unconventional capacitors that out-performed state-of-the-art by a factor of 50 (5 publications)• Designed an unorthodox high-speed photodetector that solved main limitations of conventional devices (4 publications)• Coordinated start-up of facility instrumentation (\$500K) for a multi-user semiconductor device research center• Consulted on fund appropriation & vendor selection for purchasing of undergraduate engineering lab equipment (\$15K)• Supervised 4 undergraduate and 2 graduate students (graduates now at Harvard, Raytheon, Micron Technology)	

LEADERSHIP EXPERIENCE

Community Service	2010-present
<ul style="list-style-type: none">• Judged grant proposals from university student organizations related to Optical Society of America• Assessed ten research articles for publication as a reviewer of various scientific international journals• Evaluated and decided on funding a \$100K PhD scholarship proposal for National Science Center of Poland• Adjudicated 25 science projects in Pennsylvania Junior Academy of Science Regional Competition• Led a "teaching task force" for preparing 15 graduate students on engineering teaching duties	
Instructor and Teaching assistant, Drexel University , Philadelphia, PA	2007-present
<ul style="list-style-type: none">• Taught 11 different topics on all undergraduate levels (>1200 students over 8 years)• Enhanced student involvement through novel learner-oriented lectures (two time winner of outstanding teaching award)• Moderated an award winning panel discussion on innovative teaching methods at Drexel University Teaching Showcase	
Primary Investigator, Brookhaven National Lab , Upton, NY	2011-2015
<ul style="list-style-type: none">• Advised the National Lab on upgrading the electronic lab facilities, resulting in acquirement of new measurement tools• Secured no-cost access to government research facilities & materials for projects on novel optical detectors• Led international collaborative research (3 groups) on developing advanced optical sensors (2 publications)	
Vice President, Persian Student Association (PSA), Drexel University	2014-2015
<ul style="list-style-type: none">• Executed a fundraising social with >400 attendees (winner of the best event of the year, raised >\$3000)• Organized a cultural event to introduce PSA mission to broader Drexel community (70 attendees)	

HONORS and AWARDS

Singh Nanotechnology Center Seed Grant , University of Pennsylvania. (\$3600 out of \$17000)	April 2018
Postdoctoral Travel Award , Office of Postdoctoral Affairs, Northwestern University. (\$500)	March 2017
Best Poster Award , 3rd Annual Showcase of Teaching, Drexel University.	May 2015
Best Poster Award , 1st place winner, IEEE Research Symposium, Drexel University.	Apr 2015
Outstanding Teaching Award , Office of Graduate Studies, Drexel University.	2013;2014
American Physical Society Travel Award , American Physical Society. (\$600)	Mar 2014
Allen Rothwarf Award , Electrical & Computer Engineering Department, Drexel University. (\$2000)	Jun 2013

Joseph & Shirley Carleone Endowed Fellowship, College of Engineering, Drexel University. (\$1000)
Dissertation Fellowship, Office of Graduate Studies, Drexel University (\$3000)

Apr 2013
Jan 2013

MEMBERSHIPS:

Optical Society of America, American Physical Society, Institute of Electrical and Electronics Engineers, American Chemical Society, American Association for Advancement in Science, Fellow of Iran National Foundation for Elites

SELECT RESEARCH PROJECTS

Adjunct Faculty, Center for Quantum Devices, Drexel University, Philadelphia, PA

2017-present

- ***Opto-plasmonic for Computation and Communication:***

- Developing Indium Phosphite based high data rate optical receivers for 5G and beyond communication Si photonics
- Designing deep learning hardware by utilizing a novel opto-plasmonic logic capacitor for neural networks
- Overseeing a project on making semiconductor-based THz resonant receivers using 2D electron systems for communication
- Investigating photonic properties of 2D MAX phase material systems as a medium for THz signal receivers
- Instituting a special topics graduate course to teach fundamentals of quantum computation to next generation engineers

Postdoctoral Fellow, Center for Quantum Devices, Northwestern University, Evanston, IL

2015-2017

- ***Spectral Cross-talk reduction in dual-band LWIR photodetectors:***

- Designed, simulated, and fabricated an enhanced Bragg mirror for mid-infrared to separate long and mid wave radiation incident on a two-color infrared photodetector device.
- Developed a method for integration of large-area Bragg mirrors with air dielectrics with two-channel infrared photodetectors
- Funding Agency: Defense Advanced Research Program Agency (DARPA).

- ***Quantum-disk-based cameras for far-infrared imaging:***

- Managed and led a project for making high-performance uncooled low-cost infrared photodetectors without indium bump. Such devices are based on self-assembled InAs quantum dots, and benefit from advanced transfer-printing device processing technique.
- Developed a new method for transfer and processing of membranes of III-V type-II superlattice devices to a non-native Si substrate.
- Processed and characterized mid-infrared quantum dot/well photodetectors based on InAs/InGaAs heterojunctions
- Studied transfer of infrared photodetector devices to a flexible substrate (PDMS)
- Worked on MOCVD growth and processing of InP nanowires on Si substrate
- Funding Agency: Defense Advanced Research Program Agency (DARPA).

- ***Far infrared photodetectors, FPAs, and cameras based on type II superlattice:***

- Performed MBE growth, processing, and characterization of photodetectors based on InAs/InAsSb superlattice. This resulted in world-first SWIR Ga-free infrared photodetector
- Funding agency: Army Research Lab

- ***A Comprehensive Study of Surface Defects in Traditional Type-II InAs/GaSb Superlattices and Ga-free Type-II:***

- Conducted theoretical and experimental studies on surfaces and bulk of type-II superlattices. Responsibilities included preparation of periodical progress reports
- Funding agency: Army Research Lab

Graduate Research Fellow, Optoelectronics Lab, Drexel University, Philadelphia, PA

2007-2015

- ***2D and 1D Heterojunction and Heterodimensional Devices for Optoelectronics:***

- Developed an unconventional highly sensitive photodetection technology, based on energy management in a correlated many-body 2D dimensional charge system.
- Enhanced the tuning performance of variable capacitors by a factor of 10 through applying unorthodox features of low-dimensional electron systems

- Studies optical and electrical properties of GaAs/AlGaAs core-shell nanowires using PL, and current mapping (Electron beam and Optical Induced Current) techniques
- Funding Agency: National Science Foundation.
- **Detection via Collective Excitation of Confined Charge:**
 - Investigated the performance of novel ultra high-speed photodetectors that suppress the charge transport mechanism for information transmission in electronics
 - Funding agency: National Science Foundation
- **Low-dimensional Plasmonic Semiconductor Materials:**
 - Designed, fabricated, and tested compound thin film devices for RF and THz detection through thermal energy alterations of a 2D electron systems by THz radiation.
 - Funding agency: National Science Foundation

Visiting Scientist, Center for Functional Nanomaterials, Brookhaven National Lab, Upton, NY **2011-2013; 2015-present**

- **Development of next generation integrated photonics:**
 - Composed a proposal for implementation of next generation of integrated circuits based on collective response of 2D “plasmarons” and one-dimensional nanowire devices.
- **Optical characterization of core-shell nano wires:**
 - Served as the primary investigator on a project to study optical and electrical properties GaAs/AlGaAs nano wires, including making contacts by Focused Ion Beam.

TECHNICAL EXPERTISE

Material growth and Characterization:

- *Crystall growth:* Solid Source Molecular Beam Epitaxy (MBE) of III-V compounds
- *Material characterization:* X-Ray diffraction, AFM surface morphology, Photoluminescence

Material Processing:

- *Device fabrication:* Cleanroom procedures, Photolithography, e-beam lithography, Dry etch (ICP-RIE, ECR-RIE), Chemical (wet) etch, Metallization (evaporation, sputtering, annealing), Oxide deposition (PECVD)
- *Device packaging:* Wire (ball) bonding, Wafer Dicing, Flip-chip bonding, Substrate thinning and polishing
- *Nanofabrication:* Focused Ion Beam (FIB) deposition and etch, Nanowire
- *Transfer-printing techniques:* Utilizing PDMS stamp for thin-film lift-off

Device Design and Modeling:

- *Device Design:* Synopsis Sentaurus TCAD, Schrodinger-Poisson Solvers, COMSOL, Montecarlo
- *Optical Simulation:* FDTD, Lumerical, MEEP

Device characterization:

- *Electrical measurement:* Conductivity (Hall, I-V), Impedance (C-V), RF measurement, Electron Beam Induced Current (EBIC)
- *Optical measurement:* FTIR, Photoluminescence, Raman, THz Time Domain Spectroscopy
- *Microscopy and Metrology:* SEM, AFM, Optical Microscope, Optical Profiler

Programming:

- *Languages:* MATLAB, Python, C++, L^AT_EX
- *Enterprise Software:* Labview, Origin, Igor, MS-Office

PUBLICATIONS

Conference Proceedings:

P. Dianat, “*Opto-plasmonic Photodetectors for Low-cost Optical Communication beyond 200Gb/s*”, CLEO Technology Transfer Program, San Jose CA, May 2018

B. Nabet, K. Montazeri, Z. Wang, and **P. Dianat**, “*Plasmonic Enhancement of Nanowires Optical Cavities for THz Sensing*” *Key-note Speech.*, 6th International Symposium on Sensor Science, Kenting Taiwan, Aug. 2018

B. Nabet, **P. Dianat**, Z. Wang, and K. Montazeri, “*Opto-plasmonic devices: controlling light with electrons*” *Invited.*, SPIE Defense+Security, Orlando FL, Apr.2018, 10639-16

P. Dianat K. Montazeri, and B. Nabet, “*Correlated 2D Fermion Systems as Interconnects in CMOS Circuits*”, Bulletin of the American Physical Society, Los Angeles CA, Mar. 2018

K. Montazeri, **P. Dianat**, and B. Nabet, “*Structured 2D Electron Gas Channel for Single-band THz Detector*”, Bulletin of the American Physical Society, Los Angeles CA, Mar. 2018

P. Dianat and B. Nabet, “*A Quantum Opto-plasmonic Capacitor for Low-power High-speed Information Processing*”, Frontiers in Optics Conference, Washington D.C. Sep. 2017, pp. JW3A.18

Z. Wang, **P. Dianat**, K. Montazeri, B. Taskin, M. Currie, P. Prete, N. Lovergine and B. Nabet, "A Core-Shell Nanowire Platform for Si Photonics", Frontiers in Optics Conference, Washington D.C. Sep. 2017, pp. JW4A.45

M. Currie, A. Persano, A. Taurino, F. Quaranta, A. Cola, P. Prete, N. Lovergine, **P. Dianat**, Z. Wang, B. Nabet, "Electro-Optically Sampled Time Response of Core-Shell Nanowires", Frontiers in Optics Conference, Washington D.C. Sep. 2017, pp. FTh2D.2

P. Dianat, B. Nabet, "A Quantum Opto-plasmonic Capacitor for Low-power High-speed Information Processing", 3rd EOS Topical Meeting on Optics at Nanoscale, Anacapri, Italy (Sep 2017)

Z. Wang, **P. Dianat**, K. Montazeri, B. Taskin, M. Currie, P. Prete, N. Lovergine and B. Nabet, "Nanowire-Based Opto-Plasmonics for Heterogeneous Integration with Silicon," 7th EOS Topical Meeting on Optical Microsystems, Anacapri, Italy (Sep 2017)

P. Dianat, B. Nabet, "Correlated 2-dimensional fermionic materials for attojoule-per-bit computation", Advances in Functional Materials, Los Angeles CA (Aug. 2017)

M. Razeghi, A. Haddadi, X. Suo, S. Adhikary, **P. Dianat**, R. Chevallier, A. M. Hoang, A. Dehzangi, "High-performance short-wavelength infrared photodetectors based on type-II InAs/InAs_{1-x}Sb_x/AlAs_{1-x}Sb_x superlattices," Invited Proc. SPIE 9819, Infrared Technology and Applications XLII, 98190A (May 20, 2016), doi:10.1117/12.2228611

P. Dianat et al, "A light-activated quantum capacitance device as a highly tunable variable capacitor," Frontiers in Optics Conference, Orlando FL Oct. 2013, pp. FTh4C.5.

P. Dianat, A. Persano, F. Quaranta, A. Cola and B. Nabet, "A light-activated quantum capacitance device as a highly tunable variable capacitor," Frontiers in Optics Conference, Orlando FL Oct. 2013, pp. FTh4C.5.

Z. Wang, M. Currie, **P. Dianat**, G. Konica, P. Prete, N. Lovergine and B. Nabet, "On Dimensional Dependence of Interaction of Light and Nano Structures," Frontiers in Optics Conference, Orlando FL Oct. 2013, pp. FTh3C.1.

P. Dianat, R.W. Prusak, A. Persano, F. Quaranta, A. Cola, B. Nabet, "Giant light-induced capacitance enhancements in an unconventional photodetector with 2D hole gas," IEEE Photonics Conference, San Francisco CA, 2012, pp 792-793.

P. Dianat, R.W. Prusak, F. Quaranta, A. Cola, B. Nabet, "A planar switchable capacitor with embedded two-dimensional electron system for higher integration in VLSI and RFIC," IEEE Compound Semiconductor IC Symposium, San Diego CA, Oct. 2012, pp 1-4.

M. Currie, **P. Dianat**, C. Martucci, F. Quaranta, A. Persano, A. Cola and B. Nabet, "High-speed high-responsivity low temperature grown GaAs detector," IEEE Photonics Conference, San Francisco CA, 2012, pp 312-313.

B. Nabet, J. Spanier, J. Berger, O. Leafer, **P. Dianat**, P. Prete, I. Miccoli, and N. Lovergine. "Collaborative Research on Core-Shell Nanowires for Optoelectronics", Proceedings of The Fifth International Nanotechnology Conference on Communication and Cooperation, Los Angeles, CA, 2009.

Journals:

Z. Wang, **P. Dianat**, K. Montazeri, and B. Nabet, "Enhancement of Optoelectronic Properties of Core-Shell Nanowires", Accepted for publication at IEEE Trans. Nanotechnology

P. Dianat, A. Haddadi "An enhanced Bragg mirror for optical cross-talk reduction in two-color infrared photodetectors," Under preparation for submission to Optics Letters

P. Dianat, A. Haddadi "Wafer-scale metal-bond-free infrared imagers based on transferred membranes for Sb-based type-II superlattice," Under preparation for submission to Small,

M. Naseri, A. Dehzangi, H.M. Kamari, A. See, M. Abedi, R. Salasi, A. N. Goli-kand, **P. Dianat**, F. Larki, A. Abedini, J. Hassan, A.k. Far, B.Y. Majlis "Structure and Physical Properties of NiO/Co₃O₄ Nanoparticles," Metals 2016, 6(8), 181,

A. Haddadi, X. Suo, S. Adhikary, **P. Dianat**, R. Chevallier, A. M. Hoang, M. Razeghi, "High-performance short-wavelength infrared photodetectors based on type-II InAs/InAs_{1-x}Sb_x/AlAs_{1-x}Sb_x superlattices," Appl. Phys. Lett., 107, 141104 (2015)

P. Dianat, A. Persano, F. Quaranta, A. Cola and B. Nabet, "Anomalous capacitance enhancement triggered by light," IEEE J Sel. Topics Quantum Electronics, Vol. 21, Issue 4, (2015).

B. Nabet, M. Currie, **P. Dianat**, F. Quaranta and A. Cola, "High-Speed High-Sensitivity Optoelectronic Device with Bilayer Electron & Hole Charge Plasma," ACS Photonics, 1 (7), 560-569, 2014.

P. Dianat, R.W. Prusak, A. Persano, F. Quaranta, A. Cola and B. Nabet, "An unconventional hybrid variable capacitor with a two-dimensional electron gas," IEEE. Trans. on Electron Device, Vol. 61, Issue 2, pp. 445-451, Feb. 2014.

M. Currie, **P. Dianat**, A. Persano, M.C. Martucci, F. Quaranta, A. Cola and B. Nabet, "Performance enhancement of a GaAs detector with a vertical field and an embedded thin low-temperature grown layer," Sensors, 13, (2013).

P. Dianat, R.W. Prusak, E. Gallo, F. Quaranta, A. Cola and B. Nabet, "A highly tunable heterostructure metal-semiconductor-metal capacitor utilizing embedded 2-dimensional charge," Appl. Phys. Lett. 100, 153505 (2012).

P. Dianat, A. Persano, F. Quaranta, A. Cola and B. Nabet, "Manipulation of thermodynamic energy in 2-dimensional charge systems by light," Phys. Rev. Lett., USA, Under preparation.

Book Chapters:

P. Dianat, “*Unconventional photo capacitor with giant light induced capacitance enhancement*,” in *Photodetectors: Materials, Devices and Applications*, B. Nabet (Ed), Woodhead Pub. Oxford, UK (2016) ISBN: 978-1-78242-445-1 (print)

B. Nabet, **P. Dianat**, X. Zhao, A. A. Seddik, F. Castro, and M. Currie, “*High-speed high-sensitivity low power photodetector with electron and hole charge plasma*,” in *Photodetectors: Materials, Devices and Applications*, Bahram Nabet (Ed), Woodhead/Elsevier Pub. pp 21-46, Oxford, UK (2016) ISBN: 978-1-78242-445-1 (print)

Patents:

B. Nabet, **P. Dianat**, R.W. Prusak and E. Gallo, “*Switchable Capacitors with Embedded Charge Reservoirs*.” US Patent Pending 12576262, April 18, 2012.

INTERESTS:

triathlete-in-training, endurance sports, camping, book club, artisan cooking