



PROFILE

Ph.D. candidate with a broad background in multidisciplinary science and technology, hands-on experience in solid-state nanopore fabrication, optical and electron microscopy, micro/nanofabrication, molecular biology, signal and image processing, multiphysics simulations, experimental design and statistical data analysis. Enjoy working with new technologies and find fast-paced and high-risk, high-reward situations very inspiring. Intending to graduate with Ph.D. in June 2016 and looking for opportunities in life-sciences and allied industry, particularly in biomedical technology development, next-generation sequencing, nanobiosensors, biomedical data analysis and micro/nano-manufacturing.

EDUCATION

Drexel University, Philadelphia, PA

PhD in Biomedical Engineering, Anticipated Graduation – June 2016

Relevant coursework: Nanomanufacturing, Nanometrology, Biophysics, Biochemistry, Biosimulation, Biomedical Statistics, Biomembranes, and Proteins

Amirkabir University of Technology, Tehran, Iran

Bachelor of Science in Biomedical Engineering, 2010

Relevant coursework: Diagnostics Techniques and Assay Development, Medical Devices, Organic Chemistry, Biology, Cell and Molecular Biology, Biomaterials, Basic Electronics and Electrical Engineering, Fluid Mechanics and Thermodynamics

WORKING & TRAINING EXPERIENCE

Graduate Research Assistant

Nov 12 to Present

Mechanical Engineering and Mechanics Department, Drexel University, Philadelphia

Used solid-state nanopores for single molecule detection (DNA and proteins) as well as single particle detection (liposomes, exosomes, viruses and nanoparticles). Developed nanopore-based method for morphological analysis of soft particle (virus/vesicle) deformation in nanopores. The responsibilities included:

- ▶ Fabrication of solid-state nanopore devices with microfabrication (photolithography, reactive ion etching, wet chemical etching, etc.) and nanofabrication (focused ion beam as well as scanning and transmission electron microscopy)
- ▶ Modelling biophysics of particle translocation through nanopores in COMSOL, particularly to correlate particle shape and resistive pulse signal
- ▶ Development of GUI-enabled software in MATLAB for automated batch-processing of nanopore resistive pulse signals
- ▶ Development of an image-processing software in MATLAB to analyze kinetics of nanopore shrinking by scanning electron microscopy
- ▶ Overseeing general upkeep of the lab, generated and documented standard operating protocols and implemented laboratory policies and safety regulations.
- ▶ Training undergraduate students on micro/nanofabrication techniques including photolithography, focused ion beam and electron microscopy

Graduate Research Assistant

Aug 11 to Nov 12

Department of Biochemistry & Molecular Biology, Drexel University School of Medicine, Philadelphia

Developed quantum dots labeled with anti-HIV peptides for analysis of drug-antigen interactions and broader theranostic applications. The responsibilities included:

- ▶ Development of novel water-soluble biocompatible quantum dots (gold and CdSe dots)
- ▶ Surface functionalization and bioconjugation of various quantum dots to peptides, proteins and DNA
- ▶ Performing biological assays such as enzyme linked immunosorbent assay (ELISA), western blot, etc. to study toxicity and binding of quantum dots to small molecules, cells and viruses
- ▶ Performing microscopy (fluorescence, confocal, etc.) to image binding of quantum dots to antigens on cells

Undergraduate Research Assistant

Sept 07 to Nov 10

Nanobiomaterials Lab., Amirkabir University of Technology, Tehran, Iran

Synthesized gadolinium-containing layered nanohydroxides labeled with folic acid for theranostic applications such as drug delivery to cancer tissues. The responsibilities included:

- ▶ bottom-up synthesis of nanoparticles and characterization with electron microscopy

TECHNICAL TRAININGS

- ▶ Cell culture training workshop, July 2011, School of Biomedical Engineering, Drexel University, Philadelphia, PA
- ▶ Medical Equipment Technical Supervisors' training course, April 2010, Tehran, Iran
- ▶ English Teachers Training Course, TAC-C Language Center, February - March 2007, Tehran, Iran
- ▶ Programming with MATLAB, July - August 2005, Amirkabir University of Technology, Tehran, Iran

SKILLS

Micro/Nanofabrication and characterization Techniques:

- ▶ focused ion beam (>200 hours experience with FEI Strata DB235)
- ▶ scanning electron microscopy (>100 hours experience with Zeiss Supra 50VP)
- ▶ transmission electron microscopy (>200 hours experience with JEOL JEM210)
- ▶ photolithography, reactive ion plasma etching, wet etching, etc. (processed >40 wafers)
- ▶ bottom-up synthesis of nanoparticles (quantum dots, gold nanodots, layered nanohydroxides, etc.)
- ▶ surface functionalization techniques (self-assembled monolayers, protein immobilization, etc.)
- ▶ dynamic light scattering (>50 hours experience with Malvern Zetasizer and Delsa Nano Submicron),
- ▶ plate-reader (>50 hours experience with Tecan Infinite M200 and others)
- ▶ fluorescence and UV/vis spectroscopy (>50 hours experience with Perkin Elmer instruments)
- ▶ atomic absorption spectroscopy (>30 hours experience with Varian AA240FS flame AAS)

Cellular and Molecular Biology:

- ▶ molecular assays (ELISA, Western Blot, Biacore SPR etc.)
- ▶ bioconjugation techniques (protein-protein and protein-particle conjugation)
- ▶ dialysis and gel filtration
- ▶ gel-electrophoresis
- ▶ lyophilization and ultracentrifugation of small molecules and proteins
- ▶ polymerase chain reaction (PCR)
- ▶ cell culture and cell toxicity assays
- ▶ aseptic and sterile technique
- ▶ virus production and purification
- ▶ virus infectivity assay

Computation/Programming:

- ▶ MATLAB: signal processing, image processing, GUI, etc.
- ▶ R programming: statistical analysis and data processing
- ▶ Python: statistical analysis and data processing
- ▶ COMSOL: biophysics of nanopores and nanochannels
- ▶ SPSS: statistical analysis and plotting
- ▶ Origin: statistical analysis and plotting
- ▶ Imagej: particle size analysis, gel analysis, etc.
- ▶ HTML and CSS
- ▶ Linux-based operating systems
- ▶ Adobe Creative Suite: photoshop, illustrator, dreamweaver, etc.

SELECTED PUBLICATION AND PRESENTATIONS

- ▶ **A. Darvish**, G. Goyal, Min Jun Kim, "Sensing, capturing, and interrogation of single virus particles with sold-state nanopores," SPIE Sensing Technology+ Applications. International Society for Optics and Photonics, 2015.
- ▶ G.Goyal, R. Mulero, J. Ali, **A. Darvish**, Min Jun Kim, "Low aspect ratio micropores for single-particle and single-cell analysis," Electrophoresis, in press, 2015.
- ▶ G.Goyal, **A. Darvish**, Min Jun Kim, "Controlled shrinking of nanopores in single layer graphene using electron beam irradiation," 8th International Conference on Miniaturized Systems for Chemistry and Life Sciences October 26-30, 2014, San Antonio, Texas, USA.
- ▶ M. S. Azimi, Z. T. Birgani, **A. Darvish**, S. S. Shafiei, M. Solati-Hashjin, "Ca/Al Layered Double Hydroxides: An Advanced Nanoceramic for Biomaterials Applications ", European Cells and Materials Vol. 19. Suppl. 1, pp. 19, 2010

REFERENCES

Available upon request