
PROFILE SUMMARY

- Multidisciplinary research and product development scientist, dedicated to leveraging cross-disciplinary approaches for effective problem solving and driving innovations. Experienced in designing, developing, and implementing innovative technologies across materials science, biochemistry, biophysics, sequencing technologies (NGS and nanopores), image processing, and signal processing.
- Applied training in critical parameter management (CPM), design of experiment (DOE), and statistical analysis to enhance experimental design and data analysis.
- Proficient in analysis software (JMP, Origin Lab, Igor Pro), design and graphic software (AutoCAD, Adobe Photoshop & Illustrator), and with working knowledge of programming languages (Python & MATLAB).
- Skilled in communication, mentoring, and fostering collaboration. Highly motivated with the ability to prioritize tasks effectively, ensuring alignment with project goal, and clearly articulate complex concepts to diverse audiences.

WORK EXPERIENCE

Illumina, San Diego, CA, USA

Senior Scientist at Research and Technology Development

08/2022 - present

- Working at the interface of surface/protein chemistry, enzyme-DNA/RNA interaction, library preparation, and bioinformatics to drive flow cell design and consumable development from early-stage through product development and manufacturing transfer.
- Working with various metrology tools and developing imaging assays and analysis pipelines to characterize biomolecules, protein/nucleic acid interaction, and surface properties.
- Project manager of the R&D grassroots safety culture team aimed at fostering a proactive lab safety culture throughout R&D. Responsibilities include implementing culture-based projects, setting timelines, aligning goals, and ensuring deadlines are met.

Department of Neurology, University of Pennsylvania, Philadelphia, PA, USA

Postdoctoral Researcher at the Center for Neuroengineering and Therapeutics

12/2021 - 08/2022

- Worked on the design, fabrication, and benchtop testing of bioelectronics, with the focus on: 1. advancing a lightweight, full-scale, dry EEG headset technology, with cost-effective manufacturing, for dynamic recording. 2. developing hydrogel-based wearable sensors characterized by natural adhesion and high conductivity for human health monitoring.
- Provided mentorship to undergraduate students and contributed to grant writing efforts.

Northeastern University, Boston, MA, USA

Ph.D. Researcher at Nanoscale Biophysics Laboratory

09/2016 - 11/2021

- Engineered a novel hybrid biological/synthetic nanopore platform which involved expressing and purifying a mutant portal protein from a bacteriophage and fabricating surface-modified SiN_x membranes for single-molecule biopolymer sensing. This platform achieved system stability at high voltages (up to 750 mV), 80% higher than other protein-based platforms. Investigated the structure-function relationship of engineered proteins within the nanopore framework by employing signal processing techniques. Co-invented a new method for the permanent immobilization of proteins on inorganic surfaces using silanization and click chemistry, resulted in improvement in the bioconjugation success rate from 0% to 35%.
- Initiated a new project based on using 2D materials (MXenes) as ultrathin nanopore membranes. Developed a new wafer-scale fabrication of MXene membranes with coverage and homogeneity of over 90%. Co-invented a novel class of nanopore readers for high-resolution sequencing of biomolecules based on a bilayer MXene membranes with a new sensing paradigm, expected to decrease error rates by 5-10% compared to existing market technologies.
- NSF I-Corps site program fellow and entrepreneurial lead with the mission to explore customer discovery paths for the commercialization of a new DNA sequencing technology. Through more than 20 interviews with industry experts, potential customers, and partners nationwide, explored the current pain points, user needs, and preferences and developed an initial business model.

EDUCATION

- **Ph.D.** in Bioengineering, Northeastern University, Boston, MA, USA **2021**
- **M.Sc.** in Materials Science & Engineering, Stony Brook University, Stony Brook, NY, USA. **2016**
- **B.Sc.** in Materials Science & Engineering, Sharif University of Technology, Tehran, Iran. **2014**

VOLUNTEER EXPERIENCE

- Illumina's "Future is Bright" campaign Volunteer.
- Science Outreach Volunteer at the Museum of Science in Boston.
- Secretary of Graduate Women in Science and Engineering (GWISE) Association at Northeastern University

SELECTED PUBLICATIONS & PATENTS

- "High-Voltage Biomolecular Sensing Using a Bacteriophage Portal Protein Covalently Immobilized Within a Solid-State Nanopore", *JACS*, **2022**.
- "Covalent Tethering of Portal Protein into Solid-State Nanopores", *US Patent*, US2023/067412, **2023**.
- "Wafer-Scale Lateral Self-Assembly of Mosaic Ti₃C₂Tx (MXene) Monolayer Films", *ACS Nano*, **2021**.
- "Single-Molecule Sensing Using Nanopores in Two-Dimensional Transition Metal Carbide Membranes", *ACS Nano*, **2019**.
- "A Conductive Hydrogel-Based Wearable Health Monitor", *US patent*, US 2023/0397870, **2023**.
- "MXene Nanopore Sequencer of Biopolymers", *US Patent*, US 2022/0091093, **2022**.