Shima Akar

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Highlights

- Over eight years of experience in biomedical engineering and product development across academic and industry
- Skilled in solving complex engineering and research challenges through simulation, experimentation, and analysis.
- Experienced in project management, mentorship, and multidisciplinary collaboration.
- Strong technical communication and documentation abilities with a continuous learning mindset and commitment to innovation.

Technical skills

Hands-on Technical and Laboratory Expertise

- **Fabrication & Prototyping:** Hands-on experience with soft lithography (PDMS casting), photolithography in cleanroom settings, and thermoplastic microfabrication; fabrication techniques, including 3D printing, laser cutting, and designing components for CNC machining.
- **Characterization & Microscopy:** Hands on in DLS, NTA, ATR-FTIR, UV–Vis spectroscopy, and DSC for nanoparticle and material analysis; experienced with TEM, SEM, and invert and confocal microscopy.
- **Biological Studies:** Skilled in cell culture techniques (fibroblast, keratinocyte), microplate reader assays, and ex vivo porcine skin studies for transdermal evaluation.
- **Laboratory Practices:** Experienced in following and developing Standard Operating Procedures (SOPs) to ensure accuracy, reproducibility, and compliance with lab standards.

Software and programming

- **Professional:** SolidWorks (including part, assembly, drawing, static and motion study), ANSYS Fluent (including UDF), Gambit, Tecplot, MATLAB, EES, PV Elite and Pointwise
- **Basic Knowledge:** 3-Matic, Materialize Magics, Math Mode, Rhino, Workbench (for designing and analyzing porous structures), Arduino, Proteus and COMSOL, OpenFOAM
- **Programming Languages:** Fortran and Python
- **General:** Microsoft Word, PowerPoint, Excel, SigmaPlot, Tableau and Origin
- **Graphical Software:** Adobe Photoshop and Adobe Premiere

Professional Experience

Research Assistant | Microfluidic and Nanotechnology lab | University of Victoria **May 2022 – Present**

- Developed and validated a numerical mixing model in OpenFOAM to optimize chip design.
- Designed and fabricated a microfluidic micromixer using soft lithography for controlled liposomal synthesis
- Co-encapsulation of UVA and UVB filters on a chip and conducted cell viability and ex vivo skin penetration studies to evaluate safety and retention.
- Engineered an in-house solar simulator, including PCB circuit design and optical calibration to match the UV spectrum specified by ISO standards, for accurate photostability testing.
- Formulated and tested liposomal systems with varied phase transition temperature

Teaching Assistant (over 25 TA positions) | University of Victoria **May 2022 - Present**

- Conducted tutorial and lab sessions on SolidWorks, Finite Element Analysis (FEA), PV Elite, heat transfer, and fluid mechanics for undergraduate engineering courses.
- Supervise students in design projects and the design of thermofluidic systems, providing guidance on technical analysis and project execution.

Trainee | NSERC CREATE Microsystems Technologies & Application |Toronto **Sep 2024-Present**

- Selected as a trainee in the NSERC CREATE–MTA program, integrating academic research with industry-driven training in microsystem technologies and interdisciplinary collaboration.
- Participate in technical workshops, mentorship, and national seminars, developing research, communication, and innovation skills for applied microsystem development.

Lab2Market intern | SFU innovates, UBC innovation and Business Strategy Internship Mitacs **Feb 2025-May 2025**

- Conducted 82 customer discovery interviews with various stakeholders, including dermatologists, formulators startup founders and CEOs—to validate the business model for a liposome-based, ultra-safe sunscreen venture.
- Collaborated with program mentors and facilitators to refine the value proposition and commercialization strategy, supported by weekly entrepreneurship sessions and a specialized workshop on patent strategy
- Automated stakeholder outreach using tools such as Driftify, Sales Navigator, and Calendly and Strengthened communication, networking, and strategic thinking

Professional Experience – continued

Sustainability intern | University of Victoria **May 2024** – **Aug 2024**

- Analyzed West Coast cleanup datasets using Tableau to visualize and identify fishing gear types most responsible for marine debris, linking findings to fisheries through Integrated Management Plans
- Collaborated with West Coast Environmental Law and Surfrider foundation to compile evidence and insights that supported a policy reform proposal addressing ghost gear pollution and its contribution to ocean microplastics

Product Manager | Rizsamaneh Behbood Darman (NanoSynthes) Startup | Mashhad, Iran **Oct 2021 – Apr 2022**

- Conducted market research and defined product requirements based on customer needs and regulatory standards.
- Managed the product development process from ideation to launch, prioritizing features and coordinating with cross-functional teams.
- Developed (DQ/IQ/OQ/PQ) to support system validation and regulatory compliance under GMP standards, provisional patents, and related technical documentation.

R&D Engineer | Rizsamaneh Behbood Darman (NanoSynthes) Startup | Mashhad, Iran **Jun 2020 – Oct 2021**

- Designed and fabricated microfluidic chips and its cartridge for generating nanocarriers, focusing on LNP generation for COVID-19 mRNA vaccines at pre-clinical and clinical scales.
- Collaborated in developing laboratory and industry-scale nano synthesis instruments capable of generating lipid and polymer based nanocarrier and performing quality control tests
- Optimized chip design and operation parameters for efficient liposome and chitosan nanoparticle synthesis.

Biomedical engineer | Orthopedic Research Center | Mashhad, Iran **Feb 2019 – Feb 2020**

- Engineered metallic porous biomaterials by optimizing pore size, geometry, and porosity to replicate trabecular bone permeability and enhance cell growth.
- Designed porous structures in Materialise software and validated manufacturability through SLM 3D printer
- Designed and conducted ANSYS Fluent simulations of fluid flow in porous cubes to calculate and validate permeability against experimental results.

Lab Engineer | Microfluidics Laboratory | BuAli Research Institute | Mashhad, Iran **Jan 2018 – Jan 2020**

- Defined chip fabrication procedures using micromilling of thermoplastic polymers (PMMA and PC) and optimized thermal bonding parameters
- Worked on SLA 3D printing for microfluidic chip fabrication, performed SEM and AFM surface characterization
- Developed twisted micromixer and provided technical support for cell separation and micropump/microvalve project

Research Assistant | Ferdowsi University of Mashhad **Sep 2015 – Sep 2017**

- Led and contributed to research on heat transfer enhancement using nanofluids and porous media.
- Investigated entropy generation and thermal optimization in solar stills for improved efficiency.
- Developed and analyzed targeted microchannel coating techniques using controlled magnetic fields.

Core Competencies

- **Teamwork:** Collaborated with multidisciplinary teams on research and industrial projects, effectively working with diverse cultural and professional backgrounds.
- **Problem-Solving:** Addressed complex challenges such as designing microfluidic chips for COVID-19 mRNA vaccine synthesis, applying creative and practical solutions.
- **Leadership:** Supervised two M.Sc. students and mentored undergraduate capstone teams over three semesters while managing product development initiatives.
- **Communication & Documentation:** Demonstrated strong interpersonal, verbal, and written communication skills through research publications, industrial reports, and scientific documentation.
- **Attention to Detail & Continuous Learning:** Ensured precision in quality control testing of biomechanical instruments while maintaining a continuous learning mindset to improve technical and analytical expertise.

Education

- PhD candidate in Mechanical Engineering | University of Victoria **May 2022 – May 2026**
  GPA 9.0/9.0
- M.Sc. Mechanical Engineering | Ferdowsi University of Mashhad | Mashhad, Iran **Sep 2015 – Sep 2017**
  GPA 4.0/4.0
  Project: Numerical simulations on magnetic field effects in blood flow dynamics and guiding nanoparticle-loaded stem cells through curved vessels for targeted delivery.
- B.Sc. Mechanical Engineering | Ferdowsi University of Mashhad | Mashhad, Iran **Sep 2011 – Sep 2015**
  GPA 3.77/4.0