Fatemeh Fouladi Mahani

Montreal, QC, Canada (Open to Relocation)

Status: **Open Work Permit** (until Aug. 2026 and extendable)

fatemeh.fouladi.mahani@uottawa.ca
fatemeh.fouladi.eng@gmail.com
linkedin.com/in/fatemeh-fouladi-mahani
Google Scholar
+1-343-558-8746

Summary

- **Ph.D.** in **Electrical Engineering** (November 2023) with **8+ years** of research experience in **nanophotonics**, **plasmonics**, and **integrated photonic device design**, with a strong focus on **metasurface engineering** and **photonic integration** for **optical sensing, biosensing, color filters**, and **telecommunications**
- Experience in **RF, optical, and THz communications**, including **antenna theory**, **electromagnetic modeling**, and the design of **photonic and RF front-end structures** for next-generation communication systems
- **Skilled researcher** with a track record of publishing **24+** papers in high-reputation journals and proceedings (**Cited 318+ times**, **h-index: 13**, and i10-index: 16)
- Demonstrated expertise in **experimental measurement** and **characterization** of **fabricated nanostructures** with a focus on **surface plasmon resonance (SPR) sensing** and **light-plasmon coupling**
- Proficient in theoretical design skills and **numerical simulations** with **Ansys Lumerical FDTD**, **COMSOL Multiphysics**, **Python**, and **MATLAB,** with additional experience in applying **Machine Learning** approaches to industrial projects
- **Outstanding academic performance** throughout B.Sc., M.Sc., and Ph.D. studies with top-tier grades, including a **19.50/20 in Ph.D.** and **19.43/20 in M.Sc.**, achieving **1st rank** in both degrees. Direct admission to M.Sc. and Ph.D. programs based on exceptional academic performance
- Recipient of multiple **prestigious awards** and **scholarships**, including the Scholarship Award for Talented Students, Outstanding Researcher Award, Visiting Research Scholarship Award, among others
- Strong background in **teaching**, **mentoring junior researchers**, and **leading interdisciplinary projects**; contributing to **10+ co-authored publications** on **light-trapping metasurfaces**, **graphene-integrated nanostructures**, and **photonic platforms** for **solar cells**, **sensors**, and **THz antennas**
- Experienced in writing and contributing to **research proposals** and engaging in **interdisciplinary collaborations**, with additional experience in **industry-driven research projects**

Experience

Research Assistant – International Collaboration

Centre for Research in Photonics (CRPuO), University of Ottawa

Feb. 2023 – Feb. 2024, Supervisor: Prof. Pierre Berini

- Led **optical characterization** and **experimental measurement** of **plasmonic gratings** for efficient **light-plasmon coupling** and **sensing**
- Designed **efficient plasmonic biosensors** on the end-facet of optical fibers for practical applications
- Simulated plasmonic pentamer-arranged nanohole arrays for **surface enhanced Raman scattering (SERS)**
- Published the outcomes in top-tier journals, including ***Nature Scientific Reports***, ***Physica Scripta***, and ***Biosensors***
- Received three **scholarship awards** for this visiting program from the home country, Iran:
  - **Visiting Research Scholarship Award** – Ministry of Science, Research and Technology of Iran
  - **Foreign Research Opportunity Scholarship Award** – Iran's National Elites Foundation
  - **Visiting Student Support Scholarship** – Federation of Academic Pioneers in Iran

Research Assistant

Shahid Bahonar University of Kerman and University of Ottawa

Sep. 2018 – Feb. 2023, Supervisors: *Prof. Pierre Berini* and *Prof. Arash Mokhtari*

- Designed and developed efficient plasmonic and photonic biosensors on the end-facet of dual-core optical fibers for practical applications

Shahid Bahonar University of Kerman

Sep 2015 - Sep 2018, Supervisors: *Prof. Arash Mokhtari* and *Prof. Mahdiyeh Mehran*

- Designed periodic structures for efficient plasmonic sensors, solar cells, and color filters

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Industry-Based Research Programs

Selected through a competitive process for the 5th and 6th terms of Iran's National Elites Foundation Research Programs, focused on the application of **artificial intelligence (AI) / machine learning (ML)** approaches to address industry challenges

Nov. 2020 – Aug. 2021

- Developed an intelligent control system **integrating AI/ML** for the automated and continuous monitoring of hydrocyclone performance in mineral processing lines

Dec. 2021– Sep. 2022

- Achieved optimal design of semi-autogenous grinding (SAG) mill liners using **AI/ML**, focusing on wear pattern prediction of liners in the mineral processing line of Miduk Copper Mine (recognized among the top 3 research outcomes of the program)

Teaching Assistant

Shahid Bahonar University of Kerman, Department of Electrical Engineering

• Antenna Theory • Nanophotonics and Metamaterials • Microwave Engineering • Electromagnetics • Optical Communications

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Skills

⋆Core Expertise

Photonic Devices & Nanostructures

• Plasmonics • Nanophotonics • Integrated Photonics • Metasurfaces • Nanostructures • Photonic Device Engineering • Optical Fibers • 2D Materials • Quantum Light Sources

Sensing & Functional Platforms

• Optical Sensors • Biosensors • Lab-on-Fiber Platforms • Color Filters • Nanostructured Electrodes • Solar Cells • Spectral Filtering

Communications & Electromagnetics

• Optical Communications • RF Front-End Design • THz Wave Propagation • Antenna Theory • Electromagnetic Modeling

🛠 Simulation & Design Tools

• Optical Simulation & Design • COMSOL Multiphysics • Ansys Lumerical FDTD / MODE • MATLAB • Python (NumPy, SciPy, Pandas, Matplotlib, scikit-learn) • Machine Learning • Signal Processing • Numerical Optimization Techniques

🔬 Experimental Techniques

• Experimental Measurement & Characterization of Nanostructures • Cleanroom Familiarity • Sample Preparation and Cleaning • Optical Setup Design & Alignment

Publications (Citations: 318+, h-index: 13, i10-index: 16), Google Scholar

[1] **F. F. Mahani**, L. A. M. Astorga, H. W. Choi, A. Mokhtari, and P. Berini, "Plasmonic slanted slit gratings for efficient through-substrate light-plasmon coupling and sensing," Scientific Reports – Nature, vol. 14, p. 2084, 2024.

[2] **F. F. Mahani**, A. Mokhtari, and P. Berini, "Plasmonic biosensor on the end-facet of a dual-core single-mode optical fiber," Biosensors, vol. 13, p. 558, 2023.

[3] **F. F. Mahani**, A. Mokhtari, and P. Berini, "Hybrid Si-Au plasmonic sensor on the end-facet of a dual-core optical fiber enhanced by hotspots: a theoretical study," Physica Scripta, vol. 99, p. 085523, 2024.

[4] **F. F. Mahani**, M. Maleki, A. Mokhtari, and P. Berini, "Design of an efficient Fabry-Perot biosensor using high-contrast slanted grating couplers on a dual-core single-mode optical fiber tip," IEEE Sensors Journal, vol. 21, pp. 19705-19713, 2021.

[5] Z. Khezripour, **F. F. Mahani**, and A. Mokhtari, "Performance improvement of thin-film silicon solar cells using transversal and longitudinal titanium nitride plasmonic nanogratings," Optical Materials, vol. 99, p. 109532, 2020.

[6] M. Salemizadeh, **F. F. Mahani**, and A. Mokhtari, "Tunable mid-infrared graphene-titanium nitride plasmonic absorber for chemical sensing applications," JOSA B, vol. 36, pp. 2863-2870, 2019.

[7] W. R. Wong, H. W. Choi, **F. F. Mahani**, L. A. M. Astorga, A. Mokhtari, and P. Berini, "Plasmonic pentamer-arranged nanohole arrays," in 2024 Photonics North (PN), 2024, pp. 1-2.

[8] N. Kavoosi, M. Safinejad, M. Mehran, A. Mokhtari, and **F. F. Mahani**, "Design and fabrication of enhanced anti-reflective properties using pyramid/nanowire texturization of the silicon surface," International Journal of Nanoscience and Nanotechnology, vol. 18, pp. 241-250, 2022.

[9] **F. F. Mahani** and A. Mokhtari, "Investigating the usage of nanohole array-based plasmonic silver electrodes in ITO-free organic solar cells," Nanoscale, vol. 6, pp. 26-32, 2019.

[10] A. H. Kazemi, **F. F. Mahani**, and A. Mokhtari, "Peak amplitude enhancement of photoconductive antenna using periodic nanoslit and graphene in the THz band," Optik, vol. 185, pp. 114-120, 2019.

[11] M. Salemizadeh, **F. F. Mahani**, and A. Mokhtari, "Design and development of efficient plasmonic sensors based on bi-layer of silver-SiO2 nanodisk arrays," in 2019 27th Iranian Conference on Electrical Engineering (ICEE), 2019, pp. 311-314.

[12] **F. F. Mahani**, A. Mahanipour, and A. Mokhtari, "Optimized design of nanohole array-based plasmonic color filters integrating genetic algorithm with FDTD solutions," Journal of AI and Data Mining, vol. 7, pp. 279-286, 2019.

[13] M. Salemizadeh, **F. F. Mahani**, and A. Mokhtari, "Design of aluminum-based nanoring arrays for realizing efficient plasmonic sensors," JOSA B, vol. 36, pp. 786-793, 2019.

[14] **F. F. Mahani** and A. Mokhtari, "Performance improvement of organic solar cells using a hybrid color filter electrode of graphene-aluminum nanorings," Journal of Nanoelectronics and Optoelectronics, vol. 13, pp. 1917-1923, 2018.

[15] Z. Khezripour, **F. F. Mahani**, and A. Mokhtari, "Performance improvement of ultrathin organic solar cells utilizing light-trapping aluminum-titanium nitride nanosquare arrays," Optical Materials, vol. 84, pp. 651-657, 2018.

[16] **F. F. Mahani** and A. Mokhtari, "TiO_2 circular nano-gratings as anti-reflective coatings and potential color filters for efficient organic solar cells," Journal of Nanoelectronics and Optoelectronics, vol. 13, pp. 1624-1629, 2018.

[17] **F. F. Mahani** and A. Mokhtari, "Polarization-tuned chromatic electrodes using hybrid design of graphene-aluminum nanocross arrays for efficient organic solar cells," Optical Materials, vol. 84, pp. 158-165, 2018.

[18] Z. Khezripour, **F. F. Mahani**, and A. Mokhtari, "Double-sided TiO_2 nano-gratings for broadband performance enhancement of organic solar cells," JOSA B, vol. 35, pp. 2478-2483, 2018.

[19] **F. F. Mahani**, A. Mokhtari, and M. Mehran, "Design and development of aluminum nanoring arrays for realization of dual-mode operation plasmonic color filters," JOSA B, vol. 35, pp. 1764-1771, 2018.

[20] Z. Khezripour, **F. F. Mahani**, and A. Mokhtari, "Optimized design of silicon-based moth eye nanostructures for thin film solar cells," in 2018 3rd Conference on Swarm Intelligence and Evolutionary Computation (CSIEC), 2018, pp. 1-4.

[21] **F. F. Mahani** and A. Mokhtari, "Enhancement of ITO-free organic solar cells utilizing plasmonic nanohole electrodes," in 7th International Conference on Nanotechnology (ICN), 2017.

[22] **F. F. Mahani**, A. Mokhtari, and M. Mehran, "Dual mode operation, highly selective nanohole array-based plasmonic colour filters," Nanotechnology, vol. 28, p. 385203, 2017.
[23] **F. F. Mahani**, A. Mahanipour, and A. Mokhtari, "Optimization of plasmonic color filters for CMOS image sensors by genetic algorithm," in 2017 2nd Conference on Swarm Intelligence and Evolutionary Computation (CSIEC), 2017, pp. 12-15.
[24] **F. F. Mahani** and A. Mokhtari, "Performance enhancement of nanohole array-based plasmonic color filters for CMOS image sensors," in 23rd Iranian Conference on Optics and Photonics (ICOP), and the 9th Iranian Conference on Photonics Engineering and Technology (ICPET), 2017.

Education

Shahid Bahonar University of Kerman
Ph.D. in Electrical Engineering – Field and Wave Telecommunications
Sep. 2018 – Nov. 2023, Grade: 19.50/20.00, Thesis Score: 20/20, Supervisors: *Prof. Pierre Berini* and *Prof. Arash Mokhtari*

Shahid Bahonar University of Kerman
M.Sc. in Electrical Engineering - Field and Wave Telecommunications
Sep. 2015 – Sep. 2017, Grade: 19.43/20.00, Thesis Score: 20/20, Supervisor: *Prof. Arash Mokhtari*, Advisor: *Prof. Mahdiyeh Mehran*

Shahid Bahonar University of Kerman
B.Sc. in Electrical Engineering - Telecommunications
Sep. 2011 – Sep. 2015, Grade: 16.16/20.00

Selected Honors & Awards

- ***Scholarship Award for Talented Students*** – Iran's National Elites Foundation (Dec. 2018 – Feb. 2022)
- ***Excellence in Research Award*** – Kerman Province (Dec. 2018)
- ***Foreign Research Opportunity Scholarship Award*** – Iran's National Elites Foundation (Feb. 2023 – Aug. 2023)
- ***Visiting Research Scholarship Award*** – Ministry of Science, Research and Technology of Iran (Feb. 2023 – Aug. 2023)
- ***Outstanding Researcher Award*** – Shahid Bahonar University of Kerman (Dec. 2018)
- ***Direct M.Sc. and Ph.D. Admission without Examination*** – Exceptional Talents Foundation, Shahid Bahonar University of Kerman
- ***First-Ranked M.Sc. and Ph.D. Student*** – Shahid Bahonar University of Kerman
- ***Selected for the 5th and 6th terms of Iran's National Elites Foundation Research Programs*** (Nov. 2020 – Sep. 2022)
- ***Visiting Student Support Scholarship*** – Federation of Academic Pioneers in Iran (Feb. 2023 – Oct. 2023)
- ***Research Scholarship Offer*** – from the University of Ottawa (Jun. 2023 – Jan. 2024)

Language Fluency

• English (Fluent/Advanced) • Farsi (Native) • French (Basic/Elementary)

Peer Review Contributions (Technical Reviewer)

Served as a **technical reviewer** for several prestigious journals, including:

• *Optics Express* • *JOSA A* • *Optics Letters* • *Optics Continuum* • *Optical Materials Express* • *JOSA B*