



A motivated, problem-solving research professional with several years of experience in materials characterization. Goal-oriented, self-starter, team player, and able to adapt quickly. Looking forward to applying my experience in a collaborative environment.

Education

Ph. D. in Chemical Engineering, Philadelphia, PA

Drexel University, GPA: 3.92/4.0

September 2016 – July 2021

Thesis: Investigating Carrier Dynamics in Photovoltaic Absorbers

Research advisor: Jason B. Baxter

B. S. in Chemical Engineering, Tehran, Iran

Amirkabir University of Technology

September 2010 – June 2015

Thesis: Carbon Dioxide Capture by Chemical Absorption

Research advisor: Bahram Dabir

Certificates: Machine Learning, Coursera Online, By Andrew NG Professor of Stanford University (Sep. 2018)

Technical Skills

- Photovoltaic absorber/semiconductor characterization (e.g. CdTe, CIGS, Perovskite, Si, CZTS, Cu₃AsS₄)
- Thin film fabrication
- Ultrafast time-resolved characterization of materials (Time-resolved photoluminescence, Time-resolved absorption/reflection spectroscopy: UV-Vis-IR-THz)
- Material characterization techniques (UV-Vis absorption, Static photoluminescence, SEM, TEM, XRD, FTIR)
- Research & Development
- Process design
- Team collaboration
- Mentorship
- Engineering software skills: Programming (MATLAB, Python, C++, C, Fortran, LabView) Numerical analysis, Microsoft office, COMSOL, Aspen HYSYS, SCAPS

Soft Skills

- Managed multiple projects effectively and collaborated with 5+ groups including: University of Pennsylvania, Argonne National Laboratory, Institute of Energy Conversion (IEC) – University of Delaware, Purdue University, Louisiana State University, and Helmholtz-Zentrum Berlin (HZB, Germany)
- Developed manual of operations for experimental setups and mentored graduate students in research projects
- Comfortable communicating complex data to collaborators in verbal, written, and visual formats
- An independent critical thinker, that can carry out difficult tasks effectively and according to a strict timeline
- A fast learner and able to adapt quickly; eager to learn advanced technologies

Experience

Research Assistant, Drexel University (Fall 2016-Current)

Philadelphia, PA

• **Solar cell device characterization**

In-operando measurement and analysis of solar cell devices to understand how experimental results depend on selected aspects of composition, defects, and materials' property in thin-film solar cells.

- **Ultrafast measurements and characterization of nanostructured materials**

Investigating a wide range of nanostructured materials and photovoltaic absorbers to gain a better understanding of the evolution of photoexcited electrons and holes. This advanced knowledge can translate into improved optoelectronic systems performance.

- **Nanocrystal synthesis and thin film fabrication**

Experienced in nanocrystal synthesis and optical and electrical characterization of colloids and thin films.

Key accomplishments:

- Carried out multiple collaborative research projects from academia to industry leading to five peer reviewed publications in prestigious journals, two NSF proposals and one funded project from the Department of Energy.
- Used electron microscopy techniques for photovoltaic materials to precisely probe the structural information at the atomic scale to reveal performance limiting factors.
- Developed numerical models to analyze complex experimental data and evaluated a broad range of thin film PVs leading to improved understanding of loss mechanisms that limit efficiency.
- Designed and constructed extended time-resolved terahertz spectroscopy to assess optoelectronic properties up to 10 ns (previously limited to 1.5 ns).
- Revived, and calibrated broken instruments in the lab (such as static photoluminescence) and made use of them in research projects.

Teaching Assistant,

- Drexel University (Sept. 2016- Dec. 2018) Philadelphia, PA
Courses taught: Process Systems Analysis and Control, Computational Methods, Thermodynamics II, and Solar Cell.
- English International Branch of Amirkabir University of Technology (joint with the University of Birmingham, UK), as an undergraduate student. (Sept. 2012 – May 2014) Tehran, Iran
Courses taught: Numerical Analysis, C++, and Fortran.

Key responsibilities and accomplishments:

- Designed and graded assignments and exams, taught classes of up to 80 students.
- Mentored students who needed additional guidance that helped improving their overall performance.
- Improved my communication, mentorship, and teaching skills through interaction with students.

Honors and Awards

Koerner Family Fellowship, Drexel University, April 2019 & February 2021

- Awarded to one student within each engineering discipline, intended to recognize and support the research activities pursued by outstanding Ph.D. students in Drexel's College of Engineering

Professional Affiliations

- American Institute of Chemical Engineers (AIChE)
- Materials Research Society (MRS)
- American Chemical Society (ACS)
- Institute of Electrical and Electronics Engineers (IEEE)

Publications

- **Taheri, M. M.**; Elbert, K. C.; Yang, S.; Diroll, B. T.; Park, J.; Murray, C. B.; Baxter, J. B. Distinguishing Electron and Hole Dynamics in Functionalized CdSe/CdS Core/Shell Quantum Dots Using Complementary Ultrafast Spectroscopies and Kinetic Modeling. *J. Phys. Chem. C* **2020**. <https://doi.org/10.1021/acs.jpcc.0c07037>.
- Willis, D. E.; **Taheri, M. M.**; Kizilkaya, O.; Leite, T. R.; Zhang, L.; Ofoegbuna, T.; Ding, K.; Dorman, J. A.; Baxter, J. B.; McPeak, K. M. Critical Coupling of Visible Light Extends Hot-Electron Lifetimes for H₂O₂ Synthesis. *ACS Appl. Mater. Interfaces* **2020**, 12 (20), 22778–22788. <https://doi.org/10.1021/acsami.0c00825>.
- Elbert, K. C.; **Taheri, M. M.**; Gogotsi, N.; Park, J.; Baxter, J. B.; Murray, C. B. Electron Accepting Naphthalene Bisimide Ligand Architectures for Modulation of π – π Stacking in Nanocrystal Hybrid Materials. *Nanoscale Horizons* **2020**, 5 (11), 1509–1514. <https://doi.org/10.1039/D0NH00359J>.
- McClary, S. A.; **Taheri, M. M.**; Blach, D. D.; Pradhan, A. A.; Li, S.; Huang, L.; Baxter, J. B.; Agrawal, R. Nanosecond Carrier Lifetimes in Solution-Processed Enargite (Cu₃AsS₄) Thin Films. *Appl. Phys. Lett.* **2020**, 117 (16), 162102. <https://doi.org/10.1063/5.0023246>.
- Stofela, S. K. F.; Kizilkaya, O.; Diroll, B. T.; Leite, T. R.; **Taheri, M. M.**; Willis, D. E.; Baxter, J. B.; Shelton, W. A.; Sprunger, P. T.; McPeak, K. M. A Noble-Transition Alloy Excels at Hot-Carrier Generation in the Near Infrared. *Adv. Mater.* **2020**, 32 (23), 1–8. <https://doi.org/10.1002/adma.201906478>.

Conferences

- “Quantifying Bulk and Surface Recombination in CdTe Solar Cells Using Time-Resolved Terahertz Spectroscopy” *48th IEEE Photovoltaic Specialists Conference* (June. 2021)
- “Investigating Carrier Dynamics in CdTe Full Device Studied With Time-Resolved Terahertz and Photoluminescence Spectroscopies” *Materials Research Society* (April. 2021)
- “Au-Pd Alloys for Near-Infrared Hot Carrier Devices: Structural, Electronic and Optical Properties” *American Institute of Chemical Engineers* (Nov. 2019)
- “Tunable and Efficient Hot Carrier Generation from Plasmonic Au-Pd Nanoalloy Photocatalyst” *The Electrochemical Society* (Oct. 2019)
- “Low-Voltage Electrophoretic Deposition of All-Inorganic CZTS Nanocrystals for Fabrication of Thin Films” *American Institute of Chemical Engineers* (Oct. 2017)

Reference

Dr Jason Baxter, Dept of Chemical and Biological Engineering, Drexel University, PA
Phone: (215) 895-2240, email: jbaxter@drexel.edu