



Soon-to-be graduate with a Ph.D. in Chemical and Biological Engineering. A motivated, innovative, problem-solving research professional with several years of experience in the characterization of materials such as semiconductor heterostructures and photovoltaic absorbers. Highly skilled in electrical, optical, and morphological characterization techniques. Goal-oriented, self-starter, team player, and able to adapt quickly. Looking forward to applying my experience in a corporate environment.

## Areas of Expertise

- Photovoltaic absorber characterization (e.g. CdTe, CIGS, Perovskite, Si, CZTS,  $\text{Cu}_3\text{AsS}_4$ )
- Thin film fabrication
- Characterization and synthesis of nanostructured materials
- 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
- Team collaboration
- Mentorship
- Engineering Software Skills: Programming (MATLAB, Python, C++, C, Fortran) Microsoft office, Numerical analysis, COMSOL, SCAPS. wxAMPS.

## 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
- Quick learner in data analysis and system operations; 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.

#### Key Accomplishments:

- Developed simulation models to extract photophysical parameters under operational conditions.
- Built capabilities for time-resolved terahertz spectroscopy to probe carrier lifetimes up to 10 ns (originally limited to 1.4 ns) for good quality photovoltaic materials.
- Developed a metrology platform to evaluate a wide range of thin film solar cell devices based on experimental and simulation results to expedite improvements in device efficiency.

### • 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 photophysical systems performance.

#### Key Accomplishments:

- Developed mathematical models to distinguish the electronic processes in functionalized Cd-chalcogenide quantum dots.
- Developed numerical models to simulate time-resolved photoluminescence and terahertz spectroscopy data sets to extract rate-limiting recombination processes in photovoltaic absorbers.

- **Nanocrystal synthesis and thin film fabrication**

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

**Key Accomplishment:**

- Deposited thin film photovoltaic absorbers through low-voltage, and scalable electrophoretic deposition of colloidal nanocrystals.
- Related photoexcited carrier dynamics and recombination processes in thin film absorbers to the film morphology.

## Education

**Ph. D. in Chemical Engineering**, Philadelphia, PA  
Drexel University, GPA: 3.92/4.0  
Sep. 2016 – Jun. 2021

**B. S. in Chemical Engineering**, Tehran, Iran  
Amirkabir University of Technology (Tehran Polytechnic)  
2010 – 2015

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

## Honors and Awards

**Koerner Family Fellowship**, Drexel University, April 2019

- 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

## 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. 2020, Submitted.
- 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 H<sub>2</sub>O<sub>2</sub> 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  $\pi$ – $\pi$  Stacking in Nanocrystal Hybrid Materials. *Nanoscale Horizons* **2020**, "In Press". <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 (Cu<sub>3</sub>AsS<sub>4</sub>) 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>.