Mohammad Taheri

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https://m0taheri.github.io/

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, Cu_3AsS_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 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. https://doi.org/10.1039/D0NH00359J.

- McClary, S.A.; **Taheri, M.M.**; Blach, D.D.; Pradhan, A.A.; Li, S.; Baxter, J.B.; Agrawal, R. Nanosecond Carrier Lifetimes in Solution-Processed Enargite (Cu_3AsS_4) Thin Films. *Appl Phys Lett*. **2020**, Just accepted.

- 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.