Mohammad Taheri

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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 characterization of materials such as semiconductor heterostructures and photovoltaic absorbers. Highly skilled in electrical, optical, and morphological characterization techniques. Goal-oriented, self-started, 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
- Heterostructures (semiconductor/semiconductor, metal/semiconductor, metal/metal alloy)
- 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: COMSOL, SCAPS, wxAMPS, OriginPro, Programming (MATLAB, Python, C++, C, Fortran) Microsoft office, and Numerical analysis

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 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 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: 3.91/4.0
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.

- 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.

- 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.

- 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 Horiz*. **2020**, Just accepted.