Benjamin E. Davis, Ph.D.
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EDUCATION:

- **Doctor of Philosophy, Materials Science and Engineering (Electronic Materials)**
  - Lehigh University, 2017-2023
  - Advisor: Prof. Nicholas Strandwitz
  - GPA: 3.86
- **Bachelor of Science, Materials Science and Engineering (Energy Concentration)**
  - Rutgers University, New Brunswick Campus, 2010-2014
  - Minor: Economics
  - GPA: 3.77

WORK EXPERIENCE:

- **Postdoctoral Researcher**
  Drexel University, Philadelphia, PA October 2023-present
  - Studying synthesis process for two-dimensional MXenes.
- **Graduate Research Assistant**
  Lehigh University, Bethlehem, PA August 2017-May 2023
  - Studied effects of tunnel oxide stacks on metal-semiconductor Schottky barrier height.
  - Investigated properties of atomic layer deposited aluminum oxide as a function of deposition chemistry and temperature.
  - Characterized thin film stacks for photovoltaic contact application.
- **Scientist**
  Ashwin-Ushas Corporation, Marlboro, NJ February 2017-August 2017
  - Fabricated and tested electrochemical sensors for detection of chemical warfare agents and toxic industrial chemicals.
  - Deposited films of conducting polymers for electrochromic lens application.
  - Utilized UV-Vis spectrometry to confirm film transmittance levels.
- **Junior Analytical Scientist**
  Eos Energy Storage, Edison, NJ October 2014-November 2016
  - Characterized battery materials using cyclic voltammetry, linear polarization, XPS, FTIR, SEM, EDXS, and measurements of pH, conductivity, and density of liquids.
  - Disassembled cycled batteries and test cells for failure analysis purposes.
  - Supervised electrolyte recipe synthesis and loading into completed batteries.

SKILLS:

- Thin film deposition (atomic layer deposition, thermal and electron beam evaporation)
- Material characterization techniques (ellipsometry, XPS, XRD, electrical, electrochemical)
- Ultrahigh vacuum equipment (stainless steel chambers, rough and turbo pumps)

- Programming and data analysis utilizing Matlab, MS Excel
- Training new students, interns, and technicians in research concepts and technical procedures

PUBLICATIONS:

- **Davis, B.E.** and Strandwitz, N.C. "Metal-Insulator-Semiconductor Schottky Barrier Height Modulation Utilizing High-κ Insulator Stacks." Journal article, *in preparation*.
- **Davis, B.E.** and Strandwitz, N.C. "On the Dependence of the Metal-Insulator-Semiconductor Schottky Barrier Height on Insulator Composition." *ACS Applied Electronic Materials*, submitted.
- Garland, B.M., **Davis, B.E.**, and Strandwitz, N.C (2023). "Investigating the effect of aluminum oxide fixed charge on Schottky barrier height in molybdenum oxide-based selective contacts." *Solar Energy Materials and Solar Cells*, 262: 112537
- **Davis, B.E.,** Garland, B.M., and Strandwitz, N.C. "Oxide Coatings for Semiconductor Light Absorbers: Advanced Synthesis and Applications." *Ultrathin Oxide Layers for Solar and Electrocatalytic Systems*, edited by Heinz Frei and Daniel Esposito, Royal Society of Chemistry, 12 Jan. 2022, pp. 8-26.
- Leach, C.J., **Davis, B.E.**, Garland, B.M., Thorpe, R., and Strandwitz, N.C (2021): "Ultrathin atomic layer deposited niobium oxide as a passivation layer in silicon based photovoltaics." *Journal of Applied Physics* 130 (21): 215301.
- Singhania, R.M., Price, H., Kounga, V.Y., **Davis, B.E.**, Brüner, P., Thorpe, R., Hynek, D.J., Cha, J.J., and Strandwitz, N.C. (2021): "Surface characterization of ultrathin atomic layer deposited molybdenum oxide films using high-sensitivity low-energy ion scattering." *Journal of Vacuum Science and Technology A* 39 (6): 063210.
- Hynek, D.J., Singhania, R.M., Hart, J.L., **Davis, B.E.**, Wang, M., Strandwitz, N.C., and Cha, J.J. (2021): "Effects of growth substrate on the nucleation of monolayer $MoTe_2$." *CrystalEngComm* 23 (45): 7963-7969.
- Hynek, D.J., Singhania, R.M., Xu, S., **Davis, B.E.** Wang, L., Yarali, M., Pondick, J.V., Woods, J.M., Strandwitz, N.C., and Cha, J.J. (2021), "cm^2-Scale Synthesis of $MoTe_2$ Thin Films with Large Grains and Layer Control." *ACS Nano* 15: 410-428.
- **Davis, B.E.** and Strandwitz, N.C. (2020), "Aluminum Oxide Passivating Tunneling Interlayers for Molybdenum Oxide Hole-Selective Contacts." *IEEE Journal of Photovoltaics* 10 (3): 722-728.
- Viezbicke, B.D., Patel, S., **Davis, B.E.**, and Birnie, D.P. (2015) "Evaluation of the Tauc Method for Optical Absorption Edge Determination: ZnO Thin Films as a Model System." *Physica Status Solidi B*. 252: 1700-1710.

CONFERENCE PRESENTATIONS:

- Davis, B. E. and Strandwitz, N. C. "Atomic Layer Deposited Bilayers and the Influence on Metal-Insulator-Semiconductor Schottky Barriers." *49th IEEE Photovoltaic Specialists Conference*. Jun. 5-10, 2022. Philadelphia, PA. Poster.

- Davis, B. E. and Strandwitz, N. C. "Atomic Layer Deposited Oxide Bilayers and the Metal-Insulator-Semiconductor Schottky Barrier Height." *AVS 67th International Symposium & Exhibition*. Oct. 24-29, 2021. Virtual meeting. Oral presentation.
- Davis, B. E. and Strandwitz, N. C. "Atomic Layer Deposited Metal Oxide Bilayers for Metal-Insulator-Semiconductor Photovoltaics." *51st IEEE Semiconductor Interface Specialists Conference*. Dec. 16-19, 2020. Virtual meeting. Poster.
- Davis, B. E. and Strandwitz, N. C. "Atomic Layer Deposited Metal Oxide Bilayers for Metal-Insulator-Semiconductor Photovoltaics." *MRS Fall Meeting*, Nov. 28–Dec. 4, 2020. Virtual meeting. Oral presentation.
- Davis, B. E. and Strandwitz, N. C. "Atomic Layer Deposited Metal Oxide Bilayers for Metal Insulator Semiconductor Photovoltaics." *NREL Hands-On Photovoltaic Experience*. July 6-10 & 20-24, 2020. Virtual Meeting. Poster.
- Davis, B. E. and Strandwitz, N. C. "A Systematic Investigation of Aluminum Oxide Passivating Tunnel Layers for Titanium Oxide Electron-Selective Contacts." *47th IEEE Photovoltaic Specialists Conference*. Jun. 15-Aug. 14, 2020. Virtual meeting. Poster.
- Davis, B. E. and Strandwitz, N. C. "Tunneling Back-Contacted Silicon Photovoltaics." *Department of Energy Solar Energy Technologies Office Portfolio Review*. Feb. 12-13, 2018. Washington, D.C. Poster.

PROFESSIONAL AFFILIATIONS:

- *Tau Beta Pi*, NJ Beta Chapter; 2013-present.
- *National Society of Collegiate Scholars*, Rutgers University Chapter; 2012-present.

HONORS/ACHIEVEMENTS:

- Granted Richard Hay Barkalow Award for outstanding scholarship and service; 2022.
- Awarded Lehigh University Fellowship; 2017.
- Achieved Dean's List; all undergraduate semesters.
- Awarded Malcolm G. McLaren Undergraduate Scholarship; 2012-2013.

EXTRACURRICULAR ACTIVITIES:

- *Lehigh University Presidential Search Committee*: Fall 2020-Spring 2021
  - Represented graduate students on committee selecting Lehigh's 15th president.
  - Contributed to list of qualities which ideal candidates should possess.
  - Participated in interviews and discussed candidate suitability with committee.
- *Lehigh University Sustainability Council*: Fall 2019-Spring 2021
  - Served as representative for the Graduate Student Senate.
- *Lehigh University Graduate Student Senate*: Fall 2019-Spring 2021
  - Served as Historian of the GSS Executive Board (2020-2021).
  - Served as unit representative for the Materials Science department (2019-2020).
- *The Sixth International School of Materials for Energy and Sustainability*: July 2017
- *Engineers Without Borders-Rutgers University Student Chapter*: Fall 2013-Summer 2014