

## **Benjamin E. Davis, Ph.D.**

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### EDUCATION:

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- **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:

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- **Lab Manager**

*Drexel University, Philadelphia, PA* May 2026-Present

  - Routinely inspect laboratory equipment and enforce safety practices.
  - Manage trainings, inventory and ordering of laboratory supplies.
  - Oversee laboratory renovation and improvement projects.
- **Postdoctoral Researcher**

*Drexel University, Philadelphia, PA* October 2023-May 2026

  - Studied alternative gas-phase etchants for dry synthesis of MXenes.
  - Trained and supervised students and interns in research concepts and laboratory procedures.
  - Coordinated meetings for portion of research group focused on MXene synthesis.
- **Adjunct Professor**

*Drexel University, Philadelphia, PA* January 2026-March 2026

  - Instructed the course “Modern Materials in Your World,” an introduction to Materials Science intended for undergraduate students majoring in Product Design.
  - Performed all lecturing, proctoring, and grading.
- **Graduate Research Assistant**

*Lehigh University, Bethlehem, PA* August 2017-May 2023

  - Studied effects of tunnel oxide stacks on metal-semiconductor Schottky barrier height.
  - Characterized thin film stacks for passivated 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 a broad array of techniques.
- Disassembled cycled batteries and test cells for failure analysis purposes.
- Supervised electrolyte recipe synthesis and loading into completed batteries.

PUBLICATIONS:

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- **Davis, B.E.**, LaBelle, D., Kim, H., Zhang, T., Parker, T., Ippolito, S., Shevchuk, K., Kim, J., Valurouthu, G., Hu, Y.-J., Gogotsi, Y. (2025): “Synthesis of Chlorine-Terminated MXenes by Dry Selective Extraction with  $\text{TiCl}_4$ .” *Angewandte Chemie – International Edition*: e15780.
- **Davis, B.E.**, Bi, L., and Gogotsi, Y. (2024): “MXenes: The (Near) Future of 2D Materials.” *Inside E-MRS World 2* (4): 4-6.
- **Davis, B.E.** and Strandwitz, N.C. (2024): “Dependence of the Metal-Insulator-Semiconductor Schottky Barrier Height on Insulator Composition.” *ACS Applied Electronic Materials* 6 (2): 770-776.
- 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.
- Singhanian, R.M., Price, H., Kouniga, 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., Singhanian, 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  $\text{MoTe}_2$ .” *CrystalEngComm* 23 (45): 7963-7969.
- Hynek, D.J., Singhanian, 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): “ $\text{cm}^2$ -Scale Synthesis of  $\text{MoTe}_2$  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:

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- Davis, B.E., Kim, H., Zhang, T. Ippolito, S., LaBelle, D., Rems, Hu, Y.-J., Gogotsi, Y. “Halide-Based Etching of MAX Phases for Scalable, Single-Termination MXenes.” *The 3<sup>rd</sup> International MXene Conference at Drexel University*. August 5-7, 2024. Philadelphia, PA. Poster.
- 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.

## SKILLS:

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- MXene synthesis (aqueous and vapor-phase etching)
- Thin film deposition (atomic layer deposition, electron beam and thermal evaporation)
- Material characterization techniques (XRD, SEM, XPS, ellipsometry, electrical)
- Data analysis and graphic generation utilizing Matlab, MS Excel, OriginPro
- Delivering technical lectures
- Training students, interns, and technicians

## PROFESSIONAL AFFILIATIONS:

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

## HONORS/ACHIEVEMENTS:

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- Royal Society of Chemistry *Materials Horizons* Poster Award (for “Halide-Based Etching of MAX Phases for Scalable, Single-Termination MXenes” at *The 3<sup>rd</sup> International MXene Conference at Drexel University.*), 2024.
- 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:

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- *MXene Course*: February 2024, August 2024, March 2025, February 2026
  - Delivered lecture on fundamentals of MXene synthesis for semi-annual virtual certificate course.
- *Lehigh University Presidential Search Committee*: Fall 2020-Spring 2021
  - Represented graduate students on committee selecting Lehigh’s 15<sup>th</sup> 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