

# XINLE ZHANG

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## EDUCATION

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2021-Present	Ph.D. candidate	Drexel University Materials Science and Engineering Advisor: Prof. Ekaterina Pomerantseva	Philadelphia, PA, USA
2025	M.S.	Drexel University Materials Science and Engineering	Philadelphia, PA, USA
2020	B.E.	Qingdao Agricultural University Chemical Engineering and Process	Qingdao, China

## PROFESSIONAL EXPERIENCES

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2021-Present	<b>Ph.D. Research Associate</b>	Materials Electrochemistry Group (MEG) Department of Materials Science and Engineering Drexel University, Philadelphia, PA
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Research interests span nanomaterials, layered metal oxides, MXenes, and two-dimensional heterostructures for electrochemical energy storage applications.

2023-Present	<b>Teaching Assistant</b>	Department of Materials Science and Engineering Drexel University, Philadelphia, PA
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- Materials for Energy Storage (MATE 482/582, Fall 2023 & Spring 2025)
- Materials for Emerging Technologies (MATE 100, Fall 2023) | Philly Materials Day (February 2023 & 2024) | ASM Materials Camp (June 2023 & 2024 & 2025)
- Senior Design (MATE 493, Fall 2023-Spring 2024 & Fall 2024-Spring 2025)
- Fundamental of Materials (MATE 220, Spring & Fall 2024)

## RESEARCH PROJECTS

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<b><i>Chemical Preintercalation Advances Charge Storage Performance of Layered Metal Oxide Cathodes in Li-ion Batteries</i></b>	Jun. 2023-Present MEG, Drexel University
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- Designed and performed a dual metal-ion preintercalation that shows synergistic improvement of energy density, power density, and cycling stability of bilayered vanadium oxide (BVO) cathode in lithium-ion batteries
- Established a standard analytical method based on flame atomic absorption spectroscopy (AAS) for determining the chemical compositions of the metal-ion preintercalated BVOs
- Developed a drying protocol to minimize the structural water in both active material and electrode *via* thermal annealing
- Optimized electrode fabrication improving cycling stability of Mg-preintercalated layered  $\alpha$ -MoO<sub>3</sub> cathode
- Improving specific capacity of hybrid BVO electrodes *via* chemical preintercalation of redox-active organic molecules

- MXene-Derived Na-Preintercalated BVO Cathode for Nonaqueous Na-ion Batteries*** Jan. 2025-Present  
MEG, Drexel University
- Optimized the cycling protocol that maximizes energy density while maintaining electrochemical reversibility
  - Performed an established drying procedure for both the active material and the electrodes that further optimizes Na-ion cycling stability
  - Optimizing the cell design and reduced the overpotential of the cells
- Zinc-Ion Assembly of the Layered Oxide / MXene heterostructures for Aqueous Zinc-Ion Energy Storage*** Jan. 2025-Present  
MEG, Drexel University
- Designed and performed zinc-ion assembly of  $V_2O_5/Ti_3C_2T_x$  and  $V_2O_5/V_2CT_x$  heterostructures; optimized assembly chemistry to improve performance, and reduce cost & material loss
  - Investigated and optimized the electrochemical cycling protocols for energy storage applications
- The Effect of Electrolyte Chemistries in Aqueous Zinc-Ion Batteries using Zinc-Preintercalated BVO (ZVO) Cathode Derived from  $V_2CT_x$  MXene*** Dec. 2024-Jun. 2025  
MEG, Drexel University
- Analyzed the chemistry of ZVO material using X-ray and atomic absorption spectroscopy techniques
  - Supported the interpretation of charge storage mechanisms of ZVO electrodes in  $Zn(OTf)_2$  and  $ZnCl_2$  aqueous electrolytes
- Hybrid BVO Electrodes with Large and Tunable Interlayer Distances in Li-ion Batteries*** Oct. 2021-Jun. 2024  
MEG, Drexel University
- Designed and engineered the structures of BVO cathodes that achieved large and tunable interlayer distances from 11.1 to 35.6 Å
  - Unveiled the degradation mechanisms of hybrid BVO electrodes in nonaqueous Li-ion batteries
  - Correlated the Li-ion cycling performance of hybrid BVOs with their structure, chemistry, and physical properties
- Investigation of Freestanding Binder-free CoO-Cu Nanowire Arrays as Lithium-ion Battery Anode*** Sept. 2019-Jun. 2020  
Qingdao Agricultural University
- Designed and performed proof-of-concept experiments under supervision
  - Tested, evaluated, and compared the half-cell performance of the additive-free freestanding electrodes versus the traditional slurry-coating electrodes containing additives

## PUBLICATIONS

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- Timofey Averianov, **Xinle Zhang**, Ryan Andris, Daniel Olds, Michael Zachman, Ekaterina Pomerantseva. MXene-derived potassium-preintercalated bilayered vanadium oxide nanostructures for cathodes in non-aqueous K-ion batteries. *ACS Applied Nano Materials*, 2025, 8(15), 7582-7595.
  - Xinle Zhang**, Ekaterina Pomerantseva. Enhanced cycling performance of bilayered vanadium oxide cathode in Li-ion batteries *via* dual metal-ion preintercalation. *Journal of Materials Chemistry A*, 2025, 13(17), 12170-12183.
  - Darrell Omo-Lamai, **Xinle Zhang**, Ryan Andris, Ekaterina Pomerantseva. Chemical preintercalation of magnesium ions into  $\alpha$ - $MoO_3$  structure for improved electrochemical stability in Li-ion cells. *Journal of Alloys and Compounds*, 2024, 1005, 175954.
  - Xinle Zhang**, Ryan Andris, Timofey Averianov, Michael Zachman, Ekaterina Pomerantseva. Hybrid bilayered vanadium oxide electrodes with large and tunable interlayer distance in lithium-ion batteries. *Journal of Colloid & Interface Science*, 2024, 674, 612-623.
  - Mengdie Guan, **Xinle Zhang**, Yingping Wu, Qihao Sun, Dongqi Dong, Xiaoling Zhang, Jie Wang. Biomass straw based activated porous carbon materials for high-performance supercapacitors. *Research and Application of Materials Science*, 2019, 1(2), 27-30.

## RESEARCH PROPOSALS

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- Co-applicant, “Unveiling the Nanostructures and Chemistries of Metal-Ion Preintercalated Bilayered Vanadium Oxides using Electron Microscopy”, Center for Nanophase Materials Sciences (CNMS), Oak Ridge National Lab, **2025B, Awarded**
- Co-applicant, “Electron Microscopy for Characterizing the Transformation Mechanism, Composition, and Interfaces of MXene-derived Transition Metal Oxides as Electrode Active Materials”, CNMS, Oak Ridge National Lab, **2025B, Awarded**
- Co-applicant, “Resolving Structures of Metal-Ion Preintercalated Bilayered Vanadium Oxides”, Spallation Neutron Source (SNS), Oak Ridge National Lab, **2025B, Awarded**
- Co-applicant, “Understanding the Structure of Electrochemically Active Hybrid Materials Obtained by Integrating Redox Reactive Organic Molecules with Layered Transition Metal Oxides using Electron Microscopy Characterization”, CNMS, Oak Ridge National Lab, **2023B, Awarded**
- Co-applicant, “Understanding Formation Mechanism, Composition and Heterointerfaces in Electrochemically Active MXene-Derived Transition Metal Oxides using Electron Microscopy Characterization”, CNMS, Oak Ridge National Lab, **2023B, Awarded**

## PRESENTATIONS

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- Poster Presentation, “Advancing Charge Storage Properties of Bilayered Vanadium Oxide Electrodes *via* Chemical Preintercalation of Redox-Active Organic Molecules”, Drexel Emerging Graduate Scholar (DEGS) Conference, Philadelphia, PA, April 2025.
- Poster Presentation, “Chemical Preintercalation Synthesis Advances High-Capacity Layered Metal Oxide Cathodes for Lithium-ion Batteries”, International Battery Seminar & Exhibit, Orlando, FL, March 2025.
- Oral Presentation, “Lithium-Ion Storage in Hybrid Bilayered Vanadium Oxide Electrodes with Large and Tunable Interlayer Distances”, Materials Research Society (MRS) Fall Meeting & Exhibit, Boston, MA, December 2024.
- Poster Presentation, “Chemical Preintercalation of Dual Metal-ions Enables Synergistically Enhanced Battery Performance of Bilayered Vanadium Oxide”, MRS Fall Meeting & Exhibit, Boston, MA, December 2024.
- Poster Presentation, “Non-aqueous K-ion Battery Performance of MXene-derived K-preintercalated Bilayered Vanadium Oxides Electrodes”, MRS Fall Meeting & Exhibit, Boston, MA, December 2024.
- Poster Presentation, “Resolving the Structure of MXene-Derived Potassium Preintercalated Bilayered Vanadium Oxide using Atomic Pair Distribution Function Analysis”, The 3<sup>rd</sup> International MXene Conference, Philadelphia, PA, August 2024.
- Poster Presentation, “Li<sup>+</sup> and Mg<sup>2+</sup> Co-preintercalated Bilayered Vanadium Oxide Cathode with Advanced Li-ion Storage Properties”, DEGS Conference, Philadelphia, PA, April 2024.
- Oral Presentation, “Advancing Charge Storage Properties of Layered Transition Metal Oxides by Tuning Chemistry of the Interlayer Region *via* Chemical Preintercalation Synthesis”, Drexel University, Philadelphia, PA, February 2024.
- Oral Presentation, “Microenvironment and Chemical Confinement in Electrochemical Energy Storage Systems”, Drexel University, Philadelphia, PA, June 2023.
- Poster Presentation, “Hybrid Bilayered Vanadium Oxide Cathode Materials with Tunable Interlayer Spacing for Lithium-ion Batteries”, DEGS Conference, Philadelphia, PA, April 2023.
- Poster Presentation, “Bilayered Vanadium Oxide Cathode Materials with Large Interlayer Spacing for Lithium-ion Batteries”, Start Talking Science, Science History Institute, Philadelphia PA, September 2022.

## AWARDS

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- Tuition Waiver Award, Rietveld Refinement & Indexing Clinic, International Centre for Diffraction Data (ICDD), Newtown Square, PA, Sept. 2023.
- College of Engineering Dean’s Fellowship, Drexel University, Philadelphia, PA, Sept. 2021.