Yuan Zhang

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Professional Summary

Research Assistant Professor at Drexel University and former Alexander von Humboldt Postdoctoral Fellow, with research spanning electrochemistry, nanoconfined ion transport, and two-dimensional materials. Ph.D. with highest distinction from Leibniz Institute for New Materials, Germany (summa cum laude). Publications include the *Journal of the American Chemical Society*, *ACS Nano*, *Nature Energy*, *Advanced Materials*, and *Chemical Reviews*.

Research Interests

Electrochemistry and ion transport in nanoconfined environments; MXenes and other two-dimensional materials; confined water and ion selectivity; proton-coupled electron transfer; electrochemically and mechanically tunable nanochannels; electrochemical desalination, selective ion separation, and energy storage.

Academic Contributions

Investigated the roles of confined water, subnanometer channel structure, and surface chemistry in ion selectivity and transport in MXenes and porous electrodes. Explored mechanical regulation of proton-coupled electron transfer in MXene nanoconfinement. Contributed to operando interfacial spectroscopy and international collaborative research. Led the electrochemistry subgroup at Drexel and mentored undergraduate, master's, and Ph.D. students.

Education and Work Experience

Sep. 2025-now **Research Assistant Professor, Cotswold Postdoctoral Fellow**
Feb. 2025 – Aug. 2025 **Postdoctoral researcher**
Feb. 2023 – Jan. 2025 **Alexander von Humboldt Postdoctoral Fellow**
A.J. Drexel Nanomaterials Institute & Department of Materials Science and Engineering, Drexel University
Host: Prof. Yury Gogotsi

Jun. 2018 – May. 2022 **Ph.D.**
Leibniz Institute for New Materials, Germany
Saarland University, Germany (***Summa cum Laude: with highest distinction***)

Aug. 2017 – Apr. 2018 **Student Internship**
Helmholtz Institute Ulm, Germany

Oct. 2014 – Apr. 2017 **Master of Science**
Universität Ulm, Germany
Energy Science and Technology program

Sep. 2010 – Jun. 2014 **Bachelor of Engineering**
Central South University (top university in China under Project 985), School of Thermal Energy and Engineering, Changsha, China

Teaching Experience

Feb. 2023 – now

A.J. Drexel Nanomaterials Institute & Department of Materials Science and Engineering, Drexel University

- MATE 280 Advanced Materials Laboratory (undergraduate): Lab Lecturer and Coordinator (Fall 2023)
- MXene Course (worldwide): Taught lectures on MXene Electrochemistry for Energy Storage and beyond Energy storage applications: Lecturer (2024)
- Electrochemistry Group Leader
- Mentored five undergraduate, two Master, and seven PhD students
- MATE 582 Materials for Energy Storage (Graduate), Invited Guest Lecturer (Spring 2025 & Spring 2026)
- Mentoring Senior Design Team (received 1st place in the department and 2nd place in the School of Engineering), a group of three undergraduate students, investigated MXene Photothermal Desalination Application (2026)
- Mentoring I-MESC student master's thesis (2026)
  Title: *Electrochemical Screening of MXene–Electrolyte Couples Using Cavity Microelectrode (CME)*

Echem Channel, YouTube Channel Content Creator

- Uploaded educational videos (collectively > 492,000 views as of Sept 2025) on energy storage, electrochemistry, interviews (content creator), and literature review

Jun. 2018 – May. 2022

Leibniz Institute for New Materials, Saarland University
Mentoring master's students

- **Lab course NBM-P, Saarland University**
  Electrochemical energy storage
- **Lab course ENTV, Saarland University**
  Cyclic voltammetry, galvanostatic cycling with potential limitation
- **Origin Lab Course, Saarland University**

Research Grants, Fellowships & Awards

2022

Awarded the **Alexander von Humboldt Fellowship** (**€72,000**, covering 24 months of fellowship, including research funding and travel allowance)

2023

Agilent 2023 SIRA for Advanced Materials (three awards were given among 30+ applications in North America)

- *A 5900 ICP-OES and a 1-year free loan, including consumables and services (**$26,769**), were awarded*

In charge of an internationally funded project
Commercial MXene manufacturing toward technology innovations in the UAE and beyond (for water desalination)

2024

Hydrogen bonding in water between confined MXene flakes

- *Neutron Sciences Beam Time, Oak Ridge National Laboratory (ORNL)*

Four days of beam time granted

- *CNMS proposal submitted, Oak Ridge National Laboratory (ORNL)*

Four-day experiment granted

2026 Assisted Prof. Yury Gogotsi (Drexel University) in preparing a proposal
TRAILBLAZER: Reconfigurable, Shape-Morphing, and Tunable Solid-Liquid Materials
Assisted Prof. Yury Gogotsi (Drexel University) and Prof. Patrice Simon (Toulouse University) in preparing an ERC proposal
ERC Synergy Grant 2026

2026 Awarded the **Cotswold Foundation Postdoctoral Fellowship** from Drexel University (***$83,234***, for one year of support for salary, research, and travel funding)

Service

Feb.2023 – now **Referee for journals**
JACS, Nature Communications, Materials Today Energy, ACS Nano, Advanced Science, Advanced Materials, Advanced Functional Materials, Advanced Energy Materials, Batteries and Supercaps, Chemical Engineering Journal, Journal of Material Chemistry A, Journal of Energy Storage, Journal of electrochemical society, MRS advances.

Feb.2023 – now **Group leader, Drexel University**
Electrochemistry subgroup, Drexel Nanomaterials group

July. 2024 **Poster Judge, Drexel University**
Graduate oral and poster research presentations at Drexel Emerging Graduate Scholars (DEGS) Conferences

Feb, 2025 **Supporting PI, organizer of the 2025 Gordon Research Conference.** 2025 Nanomaterials for Applications in Energy Technology Gordon Research Conference, Funding acquisition, speakers' invitation, organizing applications, travel support, etc.

May. 2025&2026 **Guest instructor, Drexel University**
Materials for Energy Storage on supercapacitors, MATE 582

Aug. 2025 **Session Chair, ACS Fall, *Washington, DC***
Chemistry of MXenes: Synthesis, Structure, Properties, and Applications: Early Career

Publications

Key publications (first/co-first authorship in bold)

Zhang, Y., Chen, M., Zhang, T., Parker, T., Zhang, D., Wang, R., Kim, H., Michałowski, P. P., Kornyshev, A., Gogotsi, Y.; Water-Mediated Ion Selectivity in 2D MXene Channels. In: ***Journal American Chemical Society***, 148 (29): 31253–31262, 2026.

Parker, T., Zhang, Y., Shevchuk, K., Zhang, T., Khokhar, T., Kim, Y., Kadagishvili, G., Bugallo, D., Tanwar, M., Davis, B., Kim, J., Fakhraai, Z., Hu, Y., Jiang, D., Talapin, D., and Gogotsi, Y. "In Situ Raman and Fourier Transform Infrared Spectroscopy Studies of MXene−Electrolyte Interfaces." In: ***ACS Nano*** 19(24): 22228-22239, 2025.

Zhang, Y., Zhang, D., Bi, L., Lei, Ming, L., Li, B., Jiang, D., Kondrat, S., Ulstrup, J., Kornyshev, A., Gogotsi, Y. "Mechanical suppression of Proton-coupled electron transfer in MXene nanoconfinement". ***Science*** (Under review)

Zhang, Y., Prehal, C., Jiang, H., Liu, Y., Feng, G., Presser, V. "Ionophobicity of carbon sub-nanometer pores enables efficient desalination at high salinity". In: ***Cell Reports Physical Science***, 100689,2021

Zhang, Y., Peng, J., Feng, G., Presser, V. "Hydration shell energy barrier differences of sub-nanometer carbon pores enable ion sieving and selective ion removal". In: ***Chemical Engineering Journal***, 419, 129438,2021.

Zhang, Y., Wang, L., Presser, V. "Electrocatalytic fuel cell desalination for continuous energy and freshwater generation". In: ***Cell Reports Physical Science***, 2 (5), 100416,2021

Other Publications (first/co-first authorship in bold)

Garg, R., Laimo, F. A., Ippolito, S., Upadhyay, P., Averbeck, S. R., Boufidis, D., et al. (including Zhang, Y.). "Soft and Transient Bioelectronics Enabled by Polymer-Free $Ti_3C_2T_x$ MXene Hydrogels." ***Advanced Materials***, e75137, 2026.

Park, C., AlHourani, J., Zhang, Y., Kim, J., FitzPatrick, J., Zhang, T., et al. "Anomalous Microwave Absorption Hysteresis in Ultrathin MXene Films with Confined Water." ***ACS Nano***, 2026.

Kondrat, S., Zhang, Y., Gogotsi, Y., Kornyshev, A. A. "Low-Dimensional Ionotronics: Focus Review." ***Chemical Reviews***, 2026.

Zhang, T., Chacon, B., Zhang, D., Cotton, A., Zhang, Y., Zhang, Y., Ippolito, S., Urban, F., Parker, T., Bi, L., Shevchuk, K., Matthews, K., Stach, E., Gogotsi, Y; "Scalable Synthesis of MXene Scrolls" ***Advanced Materials***, 38(12), e21457, 2026.

Dieng, S., Matthews, K., Valurouthu, G., Sunny, S., Zhang, Y., Ndiaye, N., Wang, R., Ngom, B., Simon, P., Gogotsi, Y; "MXene current collectors for recyclable batteries with improved capacity" ***Cell Reports Physical Science***, (accepted and will be online soon),2025

Averianov, T., Matthews, K., Zhang, X., Nguyen, H., Zhang, Y., Gogotsi, Y., Pomerantseva, E. "Operation of MXene-Derived Zinc-Preintercalated Bilayered Vanadium Oxide Cathode in Aqueous Zn-Ion Batteries, ***ACS applied energy materials***,8,17,12695–12711,2025

Roy, A., Chakraborty, A., Valurouthu, G., Zhang, Y., Bergman, G., Shpigel, N., Islam, S., Mandler, D., Gogotsi, Y; "Suppression of Halide Ion Crossover in Zn–Halide Batteries by 2D MXene Membranes, *ACS* ***Applied Materials & Interfaces***,17,35,49400–49408,2025

Thakur, A., **Zhang, Y**., Gogotsi, Y., Anasori, B; "Electrochemistry of MXenes and their sustainable energy applications", ***MRS Energy & Sustainability***, https://doi.org/10.1557/s43581-025-00130-9, 2025

Inman, A., Parker, T., Zhang, Y., Saraf, M., Gogotsi, Y., "Obtaining a practical wearable supercapacitor power supply", ***Advanced Energy Materials***,14,43,2402367,2024

Torkamanzadeh, M., Kök, C., Burger, P., Ren, P., Zhang, Y., Lee, J., Kim, C., Presser, V; "Best practice for electrochemical water desalination data generation and analysis, ***Cell Reports Physical Science***,4,11,2023

Fleischmann, S., Zhang, Y., Wang, X., Cummings, P., Wu, J., Simon, P., Gogotsi, Y., Presser, V., Augustyn, V; "Continuous transition from double-layer to Faradaic charge storage in confined electrolytes", ***Nature Energy***, 2022, 7(3): 222-228

Suss, M., Zhang, Y., Atlas, I., Gendel, Y., Ruck, EB., Presser, V; "Emerging, hydrogen-driven electrochemical water purification", ***Electrochemistry Communications***,136,107211,2022

Zhang, Y., Ren, P., Wang, L., Pameté, E., Husmann, S., Presser, V; "Selectivity toward heavier monovalent cations of carbon ultramicropores used for capacitive deionization, ***Desalination***,542,,116053,2022

Wang, L., Torkamanzadeh, M., Majed, A., Zhang, Y., Wang, Q., Breitung, B., Feng, G., Naguib, M., Presser, V; "Time-Dependent Cation Selectivity of Titanium Carbide MXene in Aqueous Solution, ***Advanced Sustainable Systems***,2100383, 2022

Zhou, J., Zhang, Y., Balda, M., Presser, V., Kopinke, F., Georgi, A; "Electro-assisted removal of polar and ionic organic compounds from water using activated carbon felts, ***Chemical Engineering Journal***,433,,133544,2022

Wang, L., Zhang, Y., Moh, K., Presser, V; "From capacitive deionization to desalination batteries and desalination fuel cells, ***Current Opinion in Electrochemistry***,29,,100758,2021

Zhang, Y., Ren, P., Liu, Y., Presser, V; "Particle size distribution influence on capacitive deionization: Insights for electrode preparation, ***Desalination***,525,115503,2021

Maughan, P., Arnold, S., Zhang, Y., Presser, V., Tapia-Ruiz, N., Bimbo, N., "In Situ Investigation of Expansion during the Lithiation of Pillared Mxenes with Ultralarge Interlayer Distance, ***The Journal of Physical Chemistry C***,125,38,20791-20797,2021

Torkamanzadeh, M., Wang, L., Zhang, Y., Budak, O., Srimuk, P., Presser, V; "MXene/activated-carbon hybrid capacitive deionization for permselective ion removal at low and high salinity, ***ACS Applied Materials & Interfaces***,12,23,26013-26025,2020

Zhang, Y., Srimuk, P., Aslan, M., Gallei, M., Presser, V. "Polymer ion-exchange membranes for capacitive deionization of aqueous media with low and high salt concentration". In: ***Desalination***, 479, 114331, 2020

Mo, T., Bi, S., Zhang, Y., Presser, V., Wang, X., Gogotsi, Y., Feng, G; "Ion structure transition enhances charging dynamics in subnanometer pores, ***ACS nano***,14,2,2395-2403,2020

Liang, Z., Zhao, C., Zhao, W., Zhang, Y., Srimuk, P., Presser, V., Feng, G; ",Molecular understanding of charge storage in MoS2 supercapacitors with ionic liquids," ***Energy & Environmental Materials***,4,4,631-637,2021

Zhang, Y., Srimuk, P., Husmann, S., Chen, M., Feng, G., Presser, V; "Effect of Pore Size on the Ion Electrosorption and Hydrogen/Deuterium Electrosorption Using Sodium Chloride in H_2O and D_2O", ***Journal of The Electrochemical Society***, 2019, 166(16)

Bi, S., **Zhang, Y**., Cervini, L., Mo, T., Griffin, J., Presser, V., Feng, G; "Permselective ion electrosorption of subnanometer pores at high molar strength enables capacitive deionization of saline water", ***Sustainable Energy & Fuels***, 2020, 4(3): 1285-1295

Presentations

Poster Presentation

Nov. 2019 — *Ph.D. Student Day of Saarland University, Saarbrücken*
Electrochemical stability of sodium chloride in H_2O and D_2O in nanoporous carbon electrodes

Nov.2023 — *MRS Fall Conference*
Suppression of Electron Transfer in Angstroms Confinement between MXene Sheets

Oral Presentations

Sep. 2019 — *7th German-Japanese Symposium on the Development and Technology of Carbon Materials, Würzburg.*

- *Title: Electrochemical stability of sodium chloride in H_2O and D_2O in nanoporous carbon electrodes. Nanoporous carbon electrodes.*

Apr. 2021 — *29th Topical ISE Meeting, online (due to COVID-19)*
Title: Sub-nanometer carbon confinement: pore size effect on ion permselectivity and selectivity

Aug. 2024 — *2024 MXene conference, Philadelphia*
Title: Mechanical Suppression of Electron Transfer in Subnanometer Confinement between MXene Layers

Oct. 2024	*2024 ECS PRiME, Honolulu, USA* *Title: Mechanical suppression of electron transfer in subnanometer confinement between MXene layers*
Feb. 2025	*2025 Gordon Research Conference & Gordon Research Conference, Nanomaterials for Applications in Energy Technology, Ventura, USA* *Title: Mechanical Suppression of Electron Transfer in MXene Nanoconfinement*
Aug. 2025	*2025 ACS Fall, Washington, DC, USA* *Title: Tunable ion transport within MXene nanoconfinement*
Aug. 2026	*4th International MXene Conference (Invited talk), Chicago, IL, USA* *Title: Water-mediated ion selectivity in 2D MXene channels*
Aug. 2026	*Agilent Webinar (Invited online webinar talk), USA* *Title: Elemental Evaluation of MXene Degradation and Application in Ion Separation*