Exponent®
Engineering & Scientific Consulting

Josh Little, Ph.D.

Scientist | Polymers & Chemistry
Bowie
+1-301-291-2565 | jlittle@exponent.com

Professional Profile

Dr. Little's areas of expertise include the formulation, synthesis, characterization, and performance of composite and polymeric materials. He routinely utilizes high-throughput testing and machining learning techniques to tackle complex challenges, including catalyst chemistry optimization and biodegradable plastic alternatives development.

Dr. Little is also skilled in inorganic material synthesis, including processing (exfoliation, crystallization, and purification) of materials such as 2D nanosheets and metal organic frameworks (MOFs). Additionally, he is knowledgeable in the design of multi-step-lab scale chemical processes for upcycling polyethylene plastics and purifying valuable feedstock monomers.

Dr. Little is experienced with various characterization tools including scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), transmission electron microscopy (TEM), powder X-ray diffraction pattern (XRD), Brunauer–Emmett–Teller (BET), thermogravimetric analysis (TGA), X-ray photoelectron spectroscopy (XPS), ultraviolet-visible (UV-Vis) spectroscopy, infrared spectroscopy (IR), Raman spectroscopy, mechanical tensile/compression testing, zetasizer, and rheology. He is also well trained in different chemical analysis skills, including high-performance liquid chromatography (HPLC) and mass spectroscopy. Lastly, he is proficient with different robotic systems including robotic arms and pipetting robots.

Prior to joining Exponent, Dr. Little was a research assistant in the Department of Chemical and Biomolecular Engineering at the University of Maryland, College Park. He engineered macroscale 2D material structures, including hydrogels and aerogels, by controlling the assembly of 2D nanosheets through targeted interactions with metal ions. He optimized catalytic performance of platinum metal nanoparticles on 2D materials by establishing critical relationships between nanoparticle structure, substrate properties, and catalytic efficiency. Dr. Little also developed and validated advanced analytical and molecular dynamics models for interlayer transport of metal ions and 2D material coating growth.

Academic Credentials & Professional Honors

Ph.D., Chemical & Biomolecular Engineering, University of Maryland, 2025

B.S., Chemistry and Spanish, Saint Bonaventure University, 2020

A. James Clark Doctoral Fellowship- University of Maryland- College Park 2020-2025

ACS Penn-York Section Excellence in Chemistry Award - St. Bonaventure University 2020

The American Institute of Chemists Award - St. Bonaventure University 2020

ACS PROMISE Award - St. Bonaventure University 2019

Professional Affiliations

American Institute of Chemical Engineers–AIChE

Publications

J. M. Little, S. Li, Y. Li, L. Wu, A. Huseynli, S. Srivastava, J. R. Coggins, T. Li, T. J. Woehl, P.-Y. Chen, Metal Ion Release Assembly: A Versatile Strategy for Scalable and Tunable 2D-Material Coatings. ACS Nano 2025, 19 (39), 34628–34642.

Y. Li, S. Schreiber, H. Yang, M. Liu, J. M. Little, Y. Luo, Y. Bao, C.-J. Shih, H. Bai, P.-Y. Chen. From Molecules to Machines: A Multiscale Roadmap to Intelligent, Multifunctional Soft Robotics. Chem. Rev. 2025

A. Kamali, J. M. Little, S. Luo, A. Chen, A. Warty. A. Bhowmick, J. Moncada, E. Jahrman, B. Vance, J. Keum, T. Woehl, P.-Y. Chen, D. Vlachos, D. Liu. Two-Dimensional (2D) MXene Supported Ruthenium Catalysts for Plastic Waste Hydrogenolysis: Mass Transport versus Confinement in Interlayer Spacing. Chem Catal. 2025

T.-C. Chung, C.-C. Liang, T. Chen, M.-W. Huang, J. M. Little, S. Shrestha, Y.-C. E Li, I.-C. Lee, P.-Y. Chen. Machine Learning Guided Design of Nerve-on-A-Chip Platforms with Promoted Neurite Outgrowth. Adv. Funct. Mater. 2025

S. He, T. Chen, Z. Li, Y. Li, J. M. Little, C. Liang, Y. Wu, I. Lee, P.Y. Chen, Lightweight, Strong, Hydrostable, Bendable, Rolled□up, and Biodegradable Straws Enabled by Nano□ and Microarchitecture Tuning of the Wood Cell Wall and Molecular Welding Strategy. Adv. Sustain. Syst. 2025

J. M. Little, A. Chen, A. Kamali, T. S. Akash, C. S. Park, D. Liu, S. Das, T. J. Woehl, P.-Y. Chen. Drying Controlled Synthesis of Catalytic Metal Nanocrystals within 2D-Material Nanoconfinements. Adv. Funct. Mater. 2024, 35. 2414746

T. Chen, S. He, Z. Pang, Y. Li, S. Shrestha, J. M. Little, H. Yang, T.-C. Chung, J. Sun, H. C. Whitley, I.-C. Lee, T. J. Woehl, T. Li, L. Hu, P.-Y. Chen. Machine Intelligence-Accelerated Discovery of All-Natural Plastic Substitutes. Nat. Nanotechnol. 2024, 782-791

S. Shrestha, K. J. Barvenik, T. Chen, H. Yang, Y. Li, M. M. Kesavan, J. M. Little, H. C. Whitley, Z. Teng, Y. Luo, E. Tubaldi, P.-Y. Chen. Machine Intelligence Accelerated Design of Conductive MXene Aerogels with Programmable Properties. Nat. Commun. 2024, 15 (1)

M. A. A. Garcia, S. Hidouri, J. M. Little, D. Modafferi, X. Hao, P. Y. Chen, N. M. Dorval Courchesne. Conductive MXene nanosheets infused in protein fiber hydrogels for bioprinting and thin film electrodes. Mater. Adv. 2024

J. M. Little, J. Sun, A. Kamali, A. Chen, A. C. Leff, Y. Li, L. K. Borden, T. U. Dissanayake, D. Essumang, B. O. Oseleononmen, D. Liu, T. J. Woehl, P.-Y. Chen. Noble Metal Ion-Directed Assembly of 2D Materials for Heterostructured Catalysts and Metallic Micro-Texturing. Adv. Funct. Mater. 2023, 2215222

Y. Li, Z. Pang, A. Ghani, J. M. Little, L. Wang, H. Yang, Y. Zhao*, P.-Y. Chen*. Gradient Structural and Compositional Design of Conductive MXene Aerogels for Stable Zn Metal Anodes. Adv. Energy Mater. 2023, 2301557

Y. Li, L. Jing, J. M. Little, H. Yang, T.-C. Chung, P.-Y. Chen. Mechanically Driven Assembly of Biomimetic 2D-Material Microtextures with Bioinspired Multifunctionality. Nano Res. 2023, 663-678

L. Jing, H. Si, T. Chen, L. Y. Hsiao, H. Yang, J. M. Little, K. Li, S. Li, Q. Xie, P. Y. Chen. Unclonable MXene Topographies as Robust Anti□Counterfeiting Tags via Fast Laser Scanning and Siamese Neural

Networks. Adv. Mater. Technol. 2023, 2300568

M. Ding, S. Li, L. Guo, L. Jing, S. P. Gao, H. T. Yang, J. M. Little, T. U. Dissanayake, K. Li, J. Yang, Y.-X. Guo, H. Y. Yang, T. J. Woehl, P. Y. Chen. Metal Ion-Induced Assembly of MXene Aerogels via Biomimetic Microtextures for Electromagnetic Interference Shielding, Capacitive Deionization, and Microsupercapacitors. Adv. Energy Mater. 2021, 11. 2101494.

Presentations

J. M. Little, A. Chen, A. Kamali, T. S. Akash, C. S. Park, D. Liu, S. Das, T. J. Woehl, P.-Y. Chen. Morphology Controlled Synthesis of Catalytic Metal Nanocrystals within 2D Material Nanoconfinements. Oral presentation, AIChE Annual Meeting, San Diego, CA, 2024.

J. M. Little, A. Chen, A. Kamali, T. S. Akash, C. S. Park, D. Liu, S. Das, T. J. Woehl, P.-Y. Chen. Morphology Controlled Synthesis of Catalytic Metal Nanocrystals within 2D Material Nanoconfinements. Oral presentation, MXene Conference, Drexel University, Philadelphia, PA, 2024.

J. M. Little. Utilizing 2D Material Confinements for New Heterogeneous Catalysts. Oral presentation, UMD ChBE Department Showcase 3 Minute Talk, College Park, MD, 2024.

J. M. Little, J. Sun, A. Kamali, A. Chen, A. C. Leff, Y. Li, L. K. Borden, T. U. Dissanayake, D. Essumang, B. O. Oseleononmen, D. Liu, T. J. Woehl, P.-Y. Chen. Nobel Metal Ion-Directed Assembly of 2D Materials for Heterostructured Catalysts and Microstructural Metallic Texturing. Oral presentation, AIChE Annual Meeting, Phoenix, AZ, 2022.

Peer Reviews

Chem Catalysis