Wei Wang, PhD

Laboratory Fellow
Pacific Northwest National Laboratory, Richland WA, 99354

Seminar: Wednesday, Feb 25th—10:30 A.M.—BS 3018 - INDY

https://purdue-edu.zoom.us/j/91841796085?pwd=UBtOM845WUkC23mONJzhmTsKAIfxrs.1

From Electrolyte Chemistry to Manufacturable Energy Storage Systems: Transport, Prototyping, and Automation-Enabled Discovery

Abstract:

As the electric power grid evolves, energy storage technologies must transition from laboratory demonstrations to manufacturable, reliable, and scalable systems that support functions such as resource adequacy, outage mitigation, and renewable integration. This seminar discusses recent advances in electrolyte chemistry for stationary energy storage, using highly concentrated and localized diluted electrolytes as case studies to illustrate how solvation structure, redox mechanisms, and proton activity influence performance under realistic operating conditions, particularly where transport limitations emerge at high areal capacity. Emphasis is placed on how electrolyte design can mitigate these transport constraints in both static and flow-based systems. The talk will also highlight automation-enabled materials and electrolyte discovery workflows that accelerate exploration of chemistry–structure–property relationships, providing faster feedback for device-level prototyping and performance evaluation. Together, these examples illustrate pathways for integrating electrolyte design, transport-aware testing, and automated experimentation toward manufacturable energy storage systems.

Biography:

Dr. Wei Wang is a Laboratory Fellow at Pacific Northwest National Laboratory (PNNL) and currently serves as the Deputy Director of the Energy Storage Research Alliance (ESRA), a U.S. Department of Energy Innovation Hub comprising 14 national laboratories and universities. He is also currently serving as a detailee to the U.S. Department of Energy's Advanced Materials and Manufacturing Technologies Office (AMMTO). His research focuses on electrolyte chemistry and electrochemical energy storage systems, with an emphasis on transport-limited behavior, device-level performance, and manufacturability considerations for stationary energy storage.

From 2019 to 2024, Dr. Wang was the Director of the Energy Storage Materials Initiative, a PNNL laboratory-directed R&D investment aimed at accelerating energy storage research through integrated materials design, transport-aware testing, and automation-enabled experimentation. He also leads the Materials Innovation through Robotics and AI Laboratory (MIRAL), which supports high-throughput materials and electrolyte discovery. Dr. Wang has published over 120 peer-reviewed journal articles and holds 23 patents in energy-related technologies, with multiple industry licenses. He has been recognized as a Clarivate Analytics Highly Cited Researcher and has received numerous awards, including the R&D 100 Award, Battelle Distinguished Inventor Award, and the U.S. EPA Green Chemistry Challenge Award. He received his Ph.D. in Materials Science and Engineering from Carnegie Mellon University.