

Intelligent Electron Microscopy: Integrating AI for Next-Generation Materials Discovery



16 January 2026

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Venue: N23-3022

Time: 14:30 - 15:30

Hosted by: Prof. Guichuan XING

Abstract

The integration of artificial intelligence (AI) into scientific research—AI for Science (AI4Science)—is fundamentally transforming chemistry and materials science. A critical frontier in this revolution is the integration of electron microscopy, a powerful characterization tool, into the AI4Science feedback loop to understand chemical processes and create novel materials. This talk will outline our group's progress in developing intelligent electron microscopy platforms. We integrate in-situ and high-throughput techniques with deep learning for simulation and real-time analysis, creating AI-driven workflows. These advanced characterization methods have accelerated the discovery of new chemical insights and materials, with demonstrated applications in optoelectronics, electrocatalysis, and battery technologies. Finally, I will share our experiences and approaches in preparing the next generation of scientists through undergraduate education initiatives in AI4Science.

Biography

Prof. Yu WANG is a Professor at South China University of Technology and he earned his Bachelor's degree from Nanjing University and his Ph.D. from Xiamen University. Following postdoctoral appointments at the University of Akron, the University of California, Berkeley, and Lawrence Berkeley National Laboratory, he joined the South China University of Technology in 2021. His research specializes in intelligent electron microscopy, where he develops in-situ and high-throughput TEM systems integrated with deep learning for simulation and analysis. He applies these advanced techniques to create novel materials for optoelectronics, molecular sensing, electrocatalysis, and battery technologies. Prof. Wang has authored 34 publications in leading journals including *Nature Communications*, *Journal of the American Chemical Society*, *Science Advances*, and *Chemical Society Reviews*.