Materials Science and Engineering Department

Winter Seminar Series

Building Diagnostics Tools to Understand Electrochemical Dynamics

Prof. Wesley Chang
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Drexel University

January 28, 2026
11AM-12PM | Hill Seminar Room (LeBow 240)

Electrochemical energy storage and conversion devices are promising alternatives to conventional fossil fuel-based technologies. Both batteries and electrolyzers undergo complex chemo-mechanical changes during operation, requiring advanced diagnostics tools for measurement and analysis. First, we present a non-contact ultrasound technique that maps porous electrode density during manufacturing. This method detects buried defects, resolves micron-scale thickness variations, and quantifies density uniformity resulting from calendaring. A simple analytical model illustrates how these physical properties are linked to measured acoustic signals. Second, we introduce an electrochemiluminescence approach for measuring reaction rates at the electrode/electrolyte interface with high temporal resolution. We use this technique to explore how fast, time-varying voltages can enhance reaction rates beyond what is possible under steady-state conditions. The method may enable automated discovery of dynamic electrochemical conditions that optimize reaction rates or selectivity.

Wes Chang is an Assistant Professor in MEM and affiliated with both MSE and CBE. Wes received his BS and MS from Stanford ChemE, his PhD from Princeton Mechanical Engineering and Materials Science, and he completed Postdoctoral appointments at Columbia and Caltech. He is the recipient of the Arnold O. Beckman Postdoctoral Fellowship, the Drexel Longsview Fellowship and Scholarly Materials and Research Equipment Award, the ORAU Ralph E. Powe Junior Faculty Enhancement Award, the ACS PRF Doctoral New Investigator Award, and The Electrochemical Society Toyota Young Investigator Award. His research group works to understand how local material properties influence electrochemical device behavior, working closely with battery startup companies and automotive manufacturers including Ford, Toyota and General Motors.

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FOR MORE INFORMATION

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