

Electrified Ultrahigh-Temperature Synthesis for Sustainable Materials, Energy, and Fuels

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12:30 PM

MAE/PRISM/ACEE Special Seminar Series



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I lead an Energy and Environmental Materials and Devices research group at the University of Maryland, College Park, with a major mission to address the CO₂ challenge. Our current research interests include (1) ultrahigh-temperature synthesis of new materials and their use in advanced energy devices, (2) beyond Li-ion batteries for transportation and the grid, and (3) wood nanoscience and nanotechnologies.

In this seminar I will share my group's research and development of electrified ultrahigh-temperature synthesis as a novel platform for discovering and manufacturing new energy and environmental materials. I will start with the design and fabrication of ultrahigh temperature heaters, followed by three specific research topics, including high entropy nanoparticles (*Science* 2018, 359, 1489, Cover), a high-performance battery membrane (*Science* 2020, 358, 521, Cover), and reactors with rapid programmable temperature for thermochemical reactions (*Nature*, 2022, CH₄ pyrolysis and NH₃ synthesis).

Liangbing Hu received his B.S. in physics from the University of Science and Technology of China in 2002, where he worked on colossal magnetoresistance (CMR) materials for three years. He did his Ph.D. (2002–2007) at UCLA, focusing on carbon-nanotube-based nanoelectronics. In 2006, he joined Unidym, Inc. as a co-founding scientist, leading the development of roll-to-roll printed carbon nanotube films and device integration in touch screens, LCDs, flexible OLEDs, and solar cells. He did his postdoc at Stanford University from 2009–2011, where he worked on various energy storage technologies using nanomaterials/nanostructures. Currently, he is a Herbert Rabin Distinguished Professor at the University of Maryland, College Park. His research group focuses on materials innovations, device integration, and manufacturing, with ongoing research activities on electrified ultrahigh-temperature synthesis, energy storage beyond Li-ion batteries, and novel wood nanotechnologies.

At the University of Maryland, Dr. Hu has published ~350 research papers (including 10 *Science* and *Nature*). He has received many awards, including: the Highly Cited Researchers list by Clarivate Analytics (2016–2021), a Blavatnik National Awards Honoree; the TAPPI Nano Middle Career Award (2019); 2018/2020/2021 R&D 100 Winner, the *Nano Letters* Young Investigator Lectureship (2017), the Office of Naval Research Young Investigator Award (2016), and the Air Force Young Investigator Award (AFOSR YIP, 2013). He is an MRS fellow.