

RESOURCES FOR INDUSTRY

GRid-connected Advanced Power Electronic Systems (GRAPES)

uwm.edu/grapes/

Rob Cuzner, Director, cuzner@uwm.edu

Making electric power systems more sustainable, cost-effective, and secure by accelerating the adoption and insertion of power electronics into the grid in order to improve system stability, flexibility, robustness, and economy. This National Science Foundation Industry/University Cooperative Research Center facilitates collaboration between academic researchers and close to 20 industry partners.

Industrial Assessment Center (UWM IAC) uwm.edu/ceas-iac/

Ryo Amano, Director, amano@uwm.edu

Helping manufacturers and utilities to increase their productivity and competitiveness by reducing energy and water consumption, enhancing cybersecurity, and adopting smart manufacturing technology with free assessments.

Advanced Analysis Facility (AAF) uwm.edu/AAF/

Ben Church, Director, church@uwm.edu

User-based research instrumentation facility that provides an alternative to private analysis laboratories for industry use, fostering collaboration with students and faculty.

Wind Tunnel

Ryo Amano, Director, amano@uwm.edu

Wisconsin's largest wind tunnel is used to test wind turbine rotor blades as researchers work to make the turbines more efficient, quieter, and longer lasting. The facility is widely used for aerodynamics, to measure airflow over buildings and many other applications.

KEY PARTNERS



Partner with us:

Andrew J. Graettinger, Associate Dean for Research,
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**College of Engineering
& Applied Science**



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ENERGY STORAGE & DISTRIBUTION RESEARCH EXPERTISE

OVERVIEW

Wisconsin is home to 1,000+ energy, power, and controls companies and its 115,000+ related jobs, and UWM is ideally located to engage industry and address emerging issues related to the electric and renewable energy economy. We're improving and transforming existing energy infrastructure and training the workforce leaders of the future.

RESEARCH HIGHLIGHTS

- Discovering **new battery materials** and techniques to improve energy storage and safety
- Developing **next-generation battery storage systems** and digital twins
- Creating more **reliable and affordable microgrids**
- **Improving insulators and dielectrics** for higher energy and more compact applications
- Building **better grid security**
- **Educating and training** tomorrow's workforce and helping Wisconsin to have the highest manufacturing employment concentration in the U.S.



EXPERT FACULTY AND FACILITIES

Renewable Energy and Batteries

Deyang Qu, UWM Distinguished Professor, Johnson Controls Endowed Professor in Energy Storage Research, Mechanical Engineering, qud@uwm.edu

- Battery chemistry and production that addresses a full product cycle from proof-of-concept to pilot production
- Energy storage and security
- EV batteries
- Battery recycling
- Reducing environmental impacts

Brian Armstrong, Professor, Mechanical Engineering, armstrong@uwm.edu

- Technology to reduce fire risk in electric vehicles and other applications that use lithium-ion batteries.



Microgrids, Naval Shipboard Systems

Rob Cuzner, Richard and Joanne Grigg Associate Professor, Electrical Engineering & Computer Science, cuzner@uwm.edu

- Microgrid protection and distribution
- Sustainable, cost-effective, and secure electric power systems
- Lab includes one-of-a-kind customized environment for electromagnetic interface measurement.
- Power-dense and efficient power electronic converter packages makes systems lighter and more efficient.



Dielectric Integrity of Power Systems

Chanyeop Park, Assistant Professor, Electrical Engineering, chanyeop@uwm.edu

- Existing and emerging dielectric challenges in advanced power and energy technologies
- Power electronic packaging, soft electronics, switchgear, partial discharge, space charge, dielectric integrity, composite, supercritical fluid



Cybersecurity, Grid Systems & Electric Transportation

Linfeng Wang, Professor, Electrical Engineering & Computer Science, wang289@uwm.edu

- Cybersecurity, cyber vulnerability of smart grid
- Smart grid and renewable energy systems, networked microgrids, high performance computing for complex power grids
- Interdependency and resiliency of national critical infrastructure, electric power system reliability, intelligent control and optimization of power and energy systems
- Electric transportation, hybrid electric vehicles

Conventional & Renewable Energy

Ryo Amano, Richard and Joanne Grigg Faculty Fellowship, Professor, Mechanical Engineering, amano@uwm.edu

- Conventional energy
 - Gas turbines, rocket engines, propulsion, pumps, compressors, aerodynamics
- Renewable energy
 - Wind, hydro, wastewater treatment, and biomass combustion, gasification and pyrolysis



Energy Storage Materials

Ben Church, Associate Professor, Materials Science & Engineering, church@uwm.edu

- Materials for energy storage
- Novel processing of metals, ceramics, and composites

Junjie Niu, Richard and Joanne Grigg Associate Professor, Materials Science & Engineering, niu@uwm.edu

- Next-generation lithium-ion and beyond batteries
- NMC based battery and polymer recycling

Self-Healing Materials

Pradeep Rohatgi, Distinguished Professor, Materials Science & Engineering, Biomedical Engineering, Mechanical Engineering, prohatgi@uwm.edu

- Self-healing, self-lubricating and self-cleaning materials
- Energy conservation and sustainability
- Foundry and metal composites under advanced manufacturing
- Scaffolds and self-healing under biomedical
- Corrosion-resistant components under water