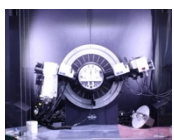


UWM Energy & Sustainability Capabilities

Faculty Areas of Expertise

Ryoichi Amano amano@uwm.edu	Minimizing erosion on machine surfaces attributed to cavitation to extend the life of parts and components through water passages. Phase change of water and vapor such as evaporation, condensation, fusion, sublimation, and deposition.
Ilya Avdeev avdeev@uwm.edu	Reduced Model Design, Entrepreneurship, AI, Digital Twin Technologies
Ben Church church@uwm.edu	Materials for energy storage, Novel Processing of metals, ceramics and composites, Physical Metallurgy.
Rob Cuzner cuzner@uwm.edu	DC, Medium-Voltage DC and Hybrid AC/DC Power Distribution Architectures, Micro-Grid Protection/Distribution, EMI Mitigation, Power Electronic Topologies and Systems for Low-Voltage and Medium-Voltage Applications
Junjie Niu niu@uwm.edu	Nanoscale science, engineering, nanotechnology and its applications in renewable energy, water-energy nexus, detection of phosphate in water, super-hydrophobic materials.
John Reisel reisel@uwm.edu	Energy Conversion Efficiency Lab, Laser Diagnostics of Combustion Processes, Alternative Fuels, Internal-Combustion Engines, Air Pollution Minimization, Gas Dynamics, Lubrication
Kevin Renken renken@uwm.edu	Energy Conversion Efficiency, Radon Reduction Technology, Compact Heat Exchanger Performance, Computational and Experimental Methods in Heat/Mass Transfer, Energy Conservation, Indoor Air Quality.
Deyang Qu qud@uwm.edu	Renewal Energy: Alkaline, Solid-State Li, Li-S, Li-Ion & Metal Air Batteries, Supercapacitors, Fuel Cells, Pb-acid Batteries, Hydrogen Storage Materials.
Linfeng Wang wang289@uwm.edu	Cyber-Physical Energy Systems Laboratory, Electric Power System Reliability, Smart Grid and Renewable Energy Systems, Electric Transportation, Intelligent and Energy-Efficient Buildings.



The **Advanced Analysis Facility (AAF)**, led by **Ben Church**, is a user-based research instrumentation facility within the College that provides an alternative to private analysis laboratories for industry use and fosters collaboration with students and faculty.

The **Center for Sustainable Electrical Energy Systems**, led by **Rob Cuzner**, is exploring methods to make electric power systems more sustainable, cost-effective, and secure through research on energy storage, microgrid systems, and renewable energy sources.

Research Focus:

- Synchronous Generator Modeling Under Unbalanced Conditions
- Hybrid Battery Life Testing
- Cost Effective Uninterruptible Power Supply
- Efficient Integrated Power System for Higher Power and Improved Survivability
- Hybrid Energy Module Development for High Efficiency Buildings



The **Energy Storage Research Lab**, led by **Deyang Qu**, is a collaboration between UWM, the Wisconsin Energy Institute (WEI) at UW-Madison and Johnson Controls. The lab links academic research with industrial product innovation to develop a new generation of energy products with longer and stronger storage abilities, increasing energy security and improving our environment by reducing carbon dioxide emitted into the atmosphere.

Research Focus:

- Metal air (Li-air and Zn-air)
- Li-Sulfur
- Li-ion
- Advanced Lead-Acid Batteries (AGM and EFB)
- Supercapacitors
- Fuel Cells
- System diagnostics
- Hydrogen Storage Materials
- Alkaline Batteries

GRid-connected Advanced Power Electronic Systems (GRAPES), led by **Rob Cuzner**, is a National Science Foundation Industry/University



Cooperative Research Center (I/UCRC) with a mission to accelerate the

adoption and insertion of power electronics into the grid in order to improve system stability, flexibility, robustness, and economy. Together with our partners we hope to make electric power systems more sustainable, cost-effective, and secure.

Research Focus

- **Energy storage systems:** inverter topology and controls, integrated compact systems, hybrid storage systems, high frequency inverters, wide band gap (WBG) devices for storage inverters, high voltage and high-power inverters, grid support functions
- **Distributed generation (DG):** inverters and interface for DG including wind and solar Photovoltaic (PV), controls for DG systems, integration of DG systems into grid
- **Microgrids:** grid-tie and island microgrids, controls for microgrids, microgrid-tie inverters, energy management
- **Reliability for power electronics converters:** low-frequency and high-frequency inverters, components, systems, and systems of systems
- **High-frequency and high-power converters:** converters with WBG power semiconductor switches, electromagnetic interference, cooling, and packaging
- **Fault protection for AC and DC microgrids**



UWM's **Industrial Assessment Center (UWM IAC)**, led by **Ryo Amano**, helps manufacturers and utilities to increase their productivity and competitiveness by reducing energy and water consumption, enhancing cybersecurity, and adopting smart manufacturing technology. The UWM IAC provides assessment services on electric power consumption, waste material removal, water treatment studies, reclamation of energy in the process of heating, power, and water processes with the implementation of biofuel production, renewable energy technology, recuperation, and reheating methods.

To date, over 600 companies and water treatment plants have utilized the UWM IAC's multidisciplinary energy assessment services, with average recommended savings of about \$150,000 per facility and an average implementation rate of 40%.

To partner with the College of Engineering & Applied Science, contact:

Andrew J. Graettinger, Associate Dean for Research, andrewjg@uwm.edu 414-229-7389

Mike Andrew, Director of Corporate Relations, andrewmg@uwm.edu. 414-251-8313