UNIVERSITY of WISCONSIN UWMILWAUKEE | College of Engineering & Applied Science

UWM Cleaner, Safer Water 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.
Woo Jin Chang wjchang@uwm.edu	Water sensor, Water quality monitoring, Electrochemical sensor, Real-time monitoring, Point-of-care detection, Disposable sensor, Wearable sensor, Microfluidics, Lab-on-a-chip.
Jin Li li@uwm.edu	Characterization of storm water pollutants, development of nano-catalysts for wastewater purification, methane production from waste water systems, characterization of E-Coli transport through water systems.
Qian Liao liao@uwm.edu	Environmental fluid mechanics, Hydrology, Modeling of transport in aquatic systems, Water Resources Engineering, Green Infrastructure, Applications of Computer Vision and Machine Learning in environmental monitoring.
Xiaoli Ma ma26@uwm.edu	Membranes and porous materials for water purification, desalination, and separation technologies. Removal of emerging contaminants including PFAS from drinking water.
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.
Krishna Pillai krishna@uwm.edu	Flow and transport in porous media, wicking of liquids in rigid and swelling porous substrates, computational fluid mechanics, evaporation of multicomponent liquids.
Pradeep Rohatgi prohatgi@uwm.edu	Self-healing, self-lubricating and self-cleaning materials research.
Nathan Salowitz salowitz@uwm.edu	New mechanical sensors and actuators intended for water systems, intelligent/multifunctional materials that can detect, report, and respond to their state.
Marcia Silva msilva@uwm.edu	Detection of bio-films, novel water sensors and novel filtration media for water purification, nanotechnology and biotechnology, mechanisms of association of microbial and chemical pollutants to particles and microbial biofilms, sensors for bacteria detection in environmental and medical samples.
Yin Wang wang292@uwm.edu	Materials and Technologies for Water Purification, Groundwater Remediation, Fate and Transport of Waterborne Pollutants, Water Chemistry. PFAS Research.

Research Focus:

- **Water sensors and devices** such as low-cost static flow meters and pressure sensors; technologies based on nanomaterials, radiofrequency or membrane electrodes for real-time detection of metals, phosphates and bacteria in drinking water; and novel devices that remove contaminants in drinking water.
- **Novel materials** for water applications, such as low-cost alloying of steel for corrosion and wear resistance; self-cleaning super hydrophobic coating with carbon/epoxy composites; ceramic absorbents to remove arsenic, selenium and viruses; and energy-efficient high-recovery membrane and filtration technologies.
- **Innovative treatment systems** focus on point-of-use technologies that remove trace metals, bacteria, viruses and emerging contaminants (such as PFAS and pharmaceuticals); nutrient and energy recovery from wastewater; and real-time controlled green infrastructures and storm water management solutions.
- **Water policy research** includes risk and regulatory compliance analyses such as, the use of nanomaterials in treatment systems; assessments of health goals and treatment options of emerging contaminants; evaluation of engineering, policy and legal options for storm water control; and point/non-point pollution mitigations.

UWM Leads Global Partnerships & Collaborations Around Water:

Water Equipment and Policy Center (WEP), led by interim director, **Qian Liao**, is a National Science Foundation Industry/University Cooperative Research Center (I/UCRC) which provides innovative water technologies and processes to promote advancement of the water industry, and conducts research to inform water policy makers. During the past 10 years, WEP has completed nearly 100 pre-competitive research projects in four thrust areas: water sensors, novel materials, innovative treatment systems and water policy research. Through research, WEP has addressed industrial partners' unmet/underserved needs in point-of-use technologies, emerging contaminants, sustainability and energy conservation.

Freshwater Collaborative of Wisconsin, led by executive director and College of Engineering & Applied Science alumna **Marissa Jablonski,** is a partnership of Wisconsin's 13 public universities, connecting with industry partners, local communities, policymakers and advocacy groups. Its mission is to train the next generation of water researchers and problem solvers and to establish Wisconsin as a global leader in water-related science, technology and economic growth. In addition to preparing future scientists and water managers, their work benefits everyone who uses or relies on water, from farmers to homeowners, outdoor enthusiasts to manufacturers.

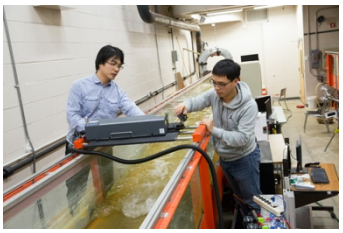
UWM was a lead university in the launch of **The Global Water Center (GWC**), which serves as the headquarters for WEP, WaTA, a $500,000 state-of-the-art flow lab, and office space for many companies and organizations serving the water industry.

These core facilities are critical to supporting the cutting-edge water research and product development activities of the water cluster. The GWC provides resources and expertise in one place that are not presently available anywhere else in the world.

UWM School of Freshwater Sciences houses research support facilities, laboratories, teaching spaces and collaboration spaces. The college also operates the 71-foot research vessel that provides year-round access to the lakes and a fully functional platform and floating laboratory.

A Few Water-Related Labs:

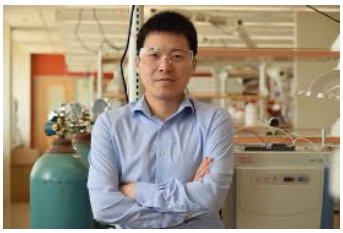
The **BioMEMS and Biosensor Laboratory,** directed by **Dr. Woo Jin Chang,** are in both Engineering and Mathematics Building and the Water Technology Accelerator in the Global Water Center. His research focuses on the development of low-cost, easy-to-use, portable, and accurate water quality monitoring devices and systems using nano- and micro-machining and electrochemical technologies.



The **Environmental Hydraulics Laboratory,** led by **Qian Liao,** is used for experiments to study contaminants, sediments and greenhouse gases in aquatic environments. Laser and machine-vision cameras are some of the state-of-the-art 3D flow measurement tools that are used here. We also apply computer models to simulate and predict pollutants and nutrients in our rivers, lakes and coastal oceans, and their impacts on the ecosystem.

The **Laboratory for Flow and Transport Studies in Porous Media**, led by **Krishna Pillai**, conducts high-quality research in diverse areas of flow and transport in porous media. Some examples of research include Designing Next-Generation Water Filters using Advanced Micro-Macro Simulations based on mathematically-rigorous Volume Averaging Method, Modeling of Unsaturated Flow through Dual-Scale Porous Fiber Mats in Liquid Composite, Wicking in Porous Media, Flow Modeling in Green Composites and Evaporation in Porous Media.

Membranes and Porous Materials Laboratory, led by **Xiaoli Ma,** focuses on porous organic framework adsorbents and covalent organic framework membranes for water treatment applications. The lab is equipped with a wide array of facilities and equipment for materials synthesis, membrane fabrication and property evaluation.



Water Research Laboratory under the direction **Junjie Niu** actually spans two labs: one at School of Freshwater Sciences (SFS), and the second at GWC. His water research focuses on materials synthesis and reactions, antibiofilm coating, microbial culture storage, water treatment, PFAS adsorption/decomposition studies.

The **Water Technology and Chemistry Laboratory**, led by **Yin Wang**, specializes in water quality engineering, catalysis, nanotechnology, and environmental chemistry. Our major research interests include: environmental applications of advanced materials; occurrence, fate and treatment of emerging and recalcitrant pollutants; advanced technologies for water treatment and groundwater remediation; and environmental chemistry.

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