EMSL offers users from around the world integrated experimental and computational resources in the biological, chemical, and environmental sciences to provide innovative solutions to the nation’s challenges. EMSL is located at Pacific Northwest National Laboratory.

Real Conditions, Real Solutions

The Joint BioEnergy Institute has drawn on EMSL’s unique suite of analytical instrumentation to identify enzymes that can break down biomass for more effective and efficient biofuels development. At EMSL, scientists are studying enzymes from rainforest soils, compost and the Arctic to determine which are more effective at degradation and how they break down biomass. With this knowledge, JBEI plans to engineer enzymes into individual sugars or alcohol, which could then be fermented to make biofuels.

Predicting Underground Transport

Knowing how uranium contaminants diffuse in water is critical for predicting their movement underground in order to protect people and ecosystems. New research using molecular dynamics techniques and EMSL's Chinook supercomputer shows that previously accepted estimates may have significantly overestimated the speed at which uranium moves with the groundwater. Taking into account uranium's non-uniformity in chemical species and particle shape, these findings support more accurate diffusion models—which will help policymakers and engineers develop better cleanup approaches.

Reducing Emissions for Next-generation Vehicles

New research at EMSL is helping make next-generation gas engines for fuel-efficient vehicles a reality. These engines release lower emissions of harmful particulate matter like soot into the air. To understand this, scientists from General Motors Research, Pacific Northwest National Laboratory, and the University of Wisconsin used a one-of-a-kind EMSL instrument to probe to observe the nanowire's structural evolution during battery use. EMSL scientists are now working with GM and Applied Sciences Inc. to study silicon and carbon fiber nanocomposites to improve batteries for electric vehicles.

A Twisting Turn for Energy Materials

To explore why batteries succeed or fail in operating conditions, scientists at EMSL pioneered the concept of building a working lithium-ion battery using a single nanowire as an electrode, and developed a custom probe to observe the nanowire’s structural evolution during battery use. EMSL scientists are now working with GM and Applied Sciences Inc. to study silicon and carbon fiber nanocomposites to improve batteries for electric vehicles.