INL houses two of the nation's three Temporal Analysis of Products systems, which provide a completely different way of studying catalysis.

Chemical Sciences Research Capabilities

A diverse array of capabilities and expertise relevant to petroleum science

Idaho National Laboratory is a publicly owned, privately operated multiprogram national laboratory. The INL Research Center (IRC) is a 280,000-square-foot laboratory and office building, including high bay areas for small-scale pilot plant research. The Energy Systems Laboratory (ESL) is a 91,000-square-foot laboratory and office facility with multiple research programs for advancing energy security and reducing risk associated with new technologies. The Energy Innovation Laboratory (EIL) is a 148,000-square-foot, state-of-the-art laboratory with office space and a meeting center. These facilities house science and technology capabilities to facilitate regional and global innovation for clean energy systems through renewable energy integration, transportation transformation, water reutilization, energy critical materials, biomass feedstock handling and advanced manufacturing.

Major Initiatives Supported

RAPID manufacturing institute member for process intensification

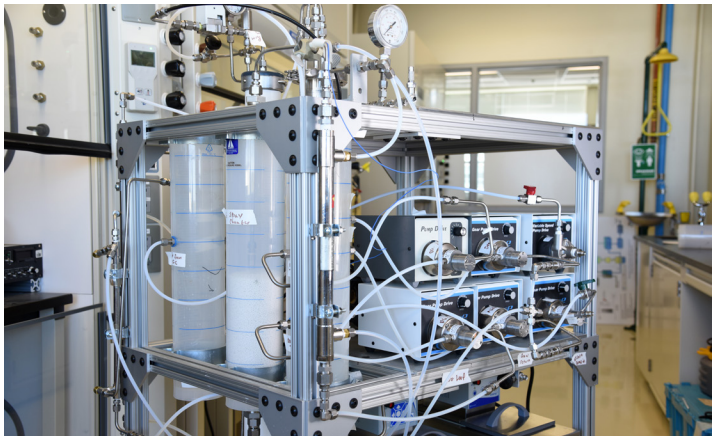
- Temporal Analysis of Product system for surface kinetics
- Critical Materials Institute for separations, recovery and impacts of rare earth elements
- REMADE manufacturing institute

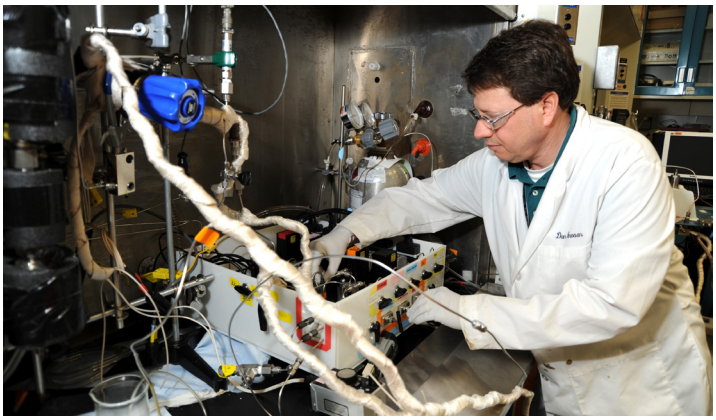
Core Capabilities

- Catalysis and catalytic processes
  - Heterogeneous catalysis: Catalyst synthesis, characterization, reaction kinetics
  - Electrocatalysis: Natural gas processing, metal recovery
  - Biocatalysis: From extreme environments, genetic engineering, synthetic biology
- Chemical and bioprocess engineering
- Separations
  - Membrane separations: Olefin/Parafin separations, gas separations, liquid vapor separations
  - Solvent extraction
  - Supercritical fluid extraction automated systems
- Water technologies
  - Switchable Polarity Solvent Forward Osmosis, ionic liquid dewatering
- Applied materials science and engineering
- Condensed matter physics and material science
- Environmental subsurface science
- Modeling and simulation
- Systems engineering and integration
- Decision science and analysis

Changing the World's Energy Future

Idaho National Laboratory





The Switchable Polarity Solvent Forward Osmosis process developed at INL (top) builds on the lab's long history of membrane science and catalysis expertise (bottom).

Key instrumentation

- Analytical Chemistry/Ultra Trace Analysis
  - Mass spectrometers
  - Inductively coupled plasma mass spectrometers
  - Ion, liquid and gas chromatography
  - Inductively coupled plasma optical emission mass spectrometry
  - Infrared and Raman spectroscopy
  - UV-Visualization
  - NIR spectroscopy
  - Fluorescence spectroscopy
  - Mass spectrometry
  - Secondary ion mass spectrometry
  - SIMS
  - Laser induced breakdown spectroscopy
  - Confocal microscopy
  - Ultrasonic testing and measurement
- Biomass Analytical Laboratory
  - Chemical and elemental composition
  - Thermochemical property determination
  - Particle size distribution and morphology
  - Material density determination
  - Material density scanning electron microscopy
  - Confocal microscopy
  - Spatially resolved FT-IR microscopy
  - Feedstock rheology
  - Pellet durability
  - Material storage performance simulator
- Biological Processing
  - Fermentors: 1.0 liter and 30 liter
  - Phenometric light-CO_2 reactors, Sixfors Reactor System
  - Realtime PCR systems
  - AKTA Pilot Protein Purification
  - Imaging systems
  - Chromatography Systems: HPLC, capillary electrophoresis, bioanalyzer
  - Microscopy: Widefield fluorescence microscope with camera
  - BSL-2 laboratories with biological safety cabinets and autoclaves
- Materials Science
  - Materials properties and performance
  - Material design, joining and testing
  - Metallography
  - Nondestructive evaluation
  - Scanning electron microscope
  - X-ray diffraction
  - Thermal conductivity microscope
  - Mechanical properties microscope
  - High-resolution microcomputed tomography
  - Noncontacting laser acoustics
  - Carbon Characterization Laboratory

For more information

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