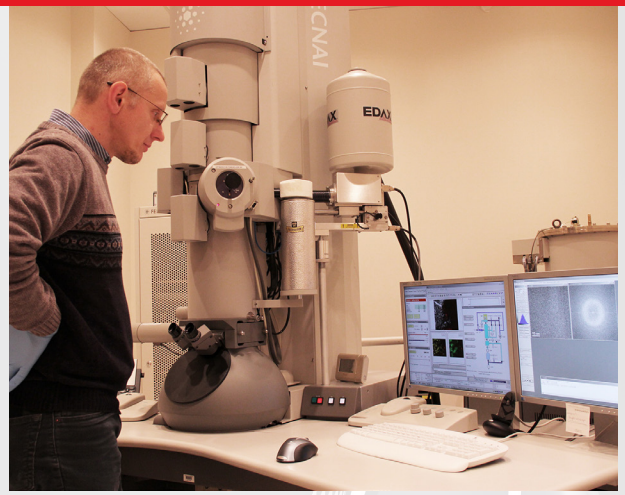
The Conn Center's MET Service Center maintains capabilities for device fabrication and testing in the following areas:

- **Energy Storage:** Lithium ion battery electrode fabrication; coin and pouch cells; battery pack and testing
- **Device Fab/Characterization:** Atomic layer deposition system; electrochemical impedance spectroscopy; intensity-modulated photocurrent spectroscopy (IMPS)/ Intensity-modulated photovoltage spectroscopy (IMVS); optical microscopy; precision ion mill/polishing system; UV-Vis spectrophotometer; nitrogen glove box; thermal evaporator; metal organic chemical vapor deposition reactor.
- **Solar Manufacturing R&D:** Roll-to-roll R&D platform, including continuous deposition of thin films from 100 nm to several mm thick; coat substrates such as plastics, metal foils and flexible glass, and speeds ranging from mm/min to 25 m/min.
- **Biomass/Biofuels:** Biomass hydrolyzate analysis for sugars; biomass carbonization; biocarbon densification – lab press and pilot briquetters with briquette characterization; waste water and biogas analyses and testing; aerobic fermentation and testing; hydrolosis and separations screenings.
- **Ultrafast Spectroscopy:** Measuring photo-induced charge and energy transfer processes at a time scale as fast as 30 fs.
- **Solar Fuels:** Electrochemical potentiostat characterization; catalyst characterization; photovoltaic/photoelectrochemical performance characterization; spectral response/quantum efficiency; hydrocarbon gas product analysis, and differential electrochemical mass spectrometry.
- **Power Electronics:** Measurements and device simulations.



Contact us for your next project!

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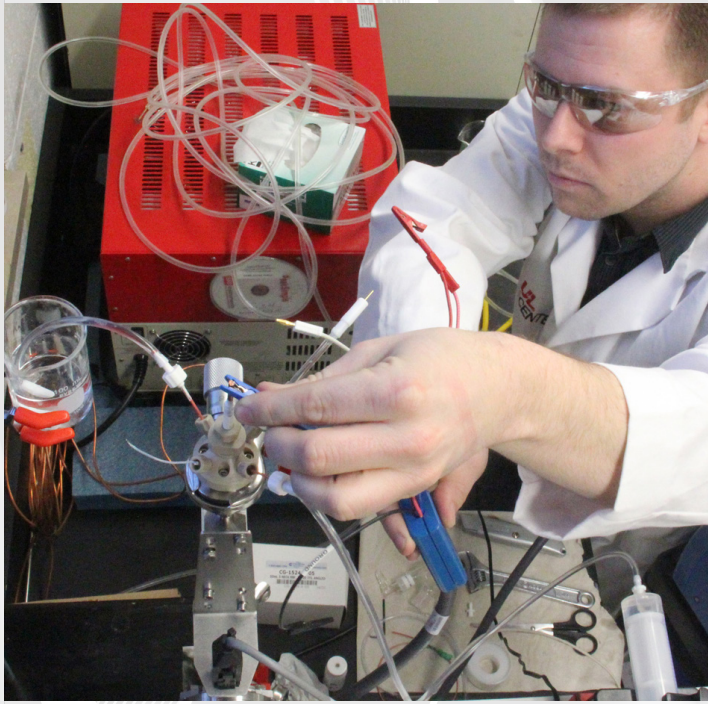
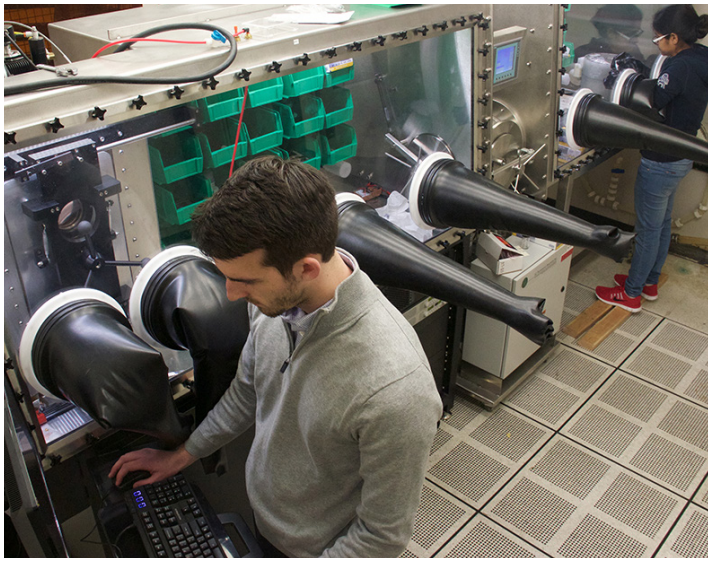


MATERIALS AND ENERGY TECHNOLOGIES SERVICE CENTER

louisville.edu/energy

Materials and Energy Technologies (MET) Service Center

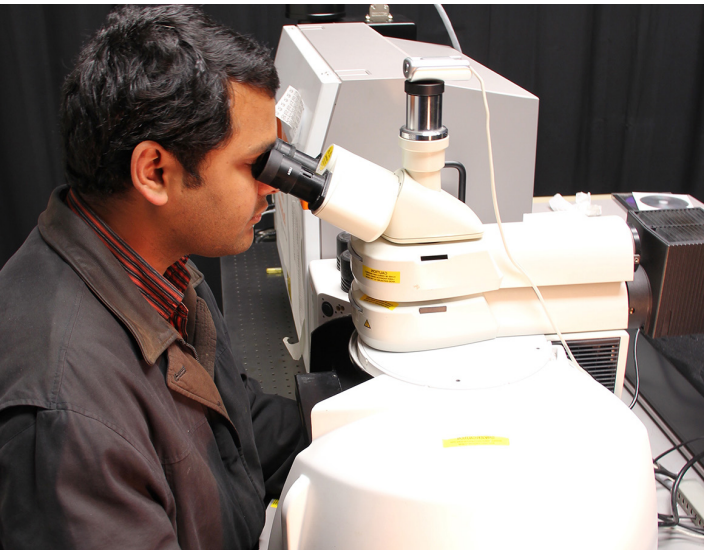
The Materials and Energy Technologies (MET) Service Center at the Conn Center for Renewable Energy Research provides several unique, advanced tools and expertise for advanced materials, their comprehensive characterization, prototyping of energy devices, and their testing.



Our capabilities and expertise help scientists and engineers from research institutions and industry produce and characterize several types of advanced materials. We can work with you to prototype and understand the performance of several energy technologies such as thin film solar cells, solar fuels, biomass/biofuels, catalysts, battery electrodes, battery cells, and systems level integration.

Preparing advanced energy materials samples:

Capabilities include microwave/ECR plasma enhanced chemical vapor deposition reactor, microwave plasma enhanced chemical vapor deposition reactor, radio frequency (RF) plasma enhanced chemical deposition reactor, electron cyclotron resonance (ECR) plasma enhanced chemical vapor deposition reactor, and metalorganic vapor chemical deposition reactor.



Characterize advanced materials:

The MET Service Center offers comprehensive microscopic and spectroscopic analytical services in the following categories.

Thermal Analysis:

- Thermogravimetric Analyzer (TGA) TA 2050
- Differential Scanning Calorimeter (DSC) TA2910
- Simultaneous TGA/DSC (SDT Q600)

Electron Microscopy:

- 200-kV FEI Tecnai F20 FEG TEM-STEM with: (a) Gatan GIF2002 EELS spectrometer, (b) EDAX and (c) Fishione HAADF detectors, (d) specialty holders
- FEI Nova600 FEG-SEM
- TESCAN Vega3 tungsten filament-SEM

Surface Analysis:

- VG Scientific MultiLab 3000 custom-built UHV system for XPS, Auger, and UPS

Optical Analysis:

- Renishaw Raman/PL system with NIR-Vis-UV optics
- PerkinElmer Spectrum BX FTIR
- Brookhaven Instrument Corporation 90Plus Particle Size Analyzer
- PerkinElmer UV/VIS/NIR spectrophotometer

X-Ray Diffractometry:

- Bruker Discovery D8 HR-XRD with scintillation and LynxEye(TM) detectors and DHS 1100 Dome Heating Stage
- Bruker EVA software and ICCD PDF-2 database

BET Analysis:

- TriStar 3000 gas adsorption analyzer