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## Manufacturing Laboratory

The Manufacturing Laboratory at NREL's Energy Systems Integration Facility (ESIF) focuses on developing methods and technologies that will assist manufacturers of hydrogen and fuel cell technologies, as well as other renewable energy technologies, to scale up their manufacturing capabilities to volumes that meet DOE and industry targets. Specifically, the manufacturing activity is currently focused on developing and validating quality control techniques to assist manufacturers of low temperature and high temperature fuel cells in the transition from low to high volume production methods for cells and stacks. Capabilities include initial proof-of-concept studies through prototype system development and in-line validation. Existing diagnostic capabilities address a wide range of materials, including polymer films, carbon and catalyst coatings, carbon fiber papers and wovens, and multi-layer assemblies of these materials, as well as ceramic-based materials in pre- or post-fired forms.

### Laboratory Specifications

This laboratory includes continuous web processing (roll-to-roll) equipment and various diagnostic measurement platforms. The lab will be used for internal development, evaluation of commercial diagnostics, and as a flexible development platform (user facility) for industry partner R&D.

### Application Scenarios

Work leading to the development of non-contact, non-destructive techniques to measure critical dimensional and functional properties of fuel cell and other materials, and validation of those techniques on the continuous processing line. This work will be supported by materials provided by our partners.

Looking forward, the equipment in the laboratory is set up to be modified and extended to provide processing capabilities such as coating, casting, and deposition of functional layers, as well as associated processes such as drying or curing. In addition, continuous processes are used for components of organic and thin film photovoltaics (PV) as well as battery technologies, so synergies with these important areas will be explored.

### Partner with Us

Work with NREL experts and take advantage of the state-of-the-art capabilities at the ESIF to make progress on your projects, which may range from fundamental research to applications engineering. Partners at the ESIF's Manufacturing Laboratory may include:

- Manufacturers of cells and cell components for low and high temperature fuel cells
- Manufacturers of other renewable energy technologies using and/or exploring roll-to-roll processing
- Manufacturers or developers of quality control devices
- Manufacturers of continuous processing equipment
- Certification laboratories
- Universities
- Other National laboratories

### Contact Us

If you are interested in working with NREL's Manufacturing Laboratory, please contact:

#### ESIF Manager

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### Major Laboratory Equipment

- Continuous processing line
  - Suitable for 6" - 18" wide webs
  - One to 100 foot per minute line speed
  - 0.5 - 5.0 pounds per lineal inch tension range
- Infrared diagnostic platform:
  - IR camera detector with various optics
  - Various excitation strategies
  - Sample hardware for various static measurements
  - Benchtop roller prototype
  - Commercial data acquisition and processing software
- Optical diagnostic platform:
  - Various detectors, sources, and lenses
  - In-house developed data acquisition and processing software
  - Motion stage
- Thickness measurement:
  - Dual laser thickness instrument
  - Ultra-low force pneumatic caliper

