Collaboration and Education

Through the work of the SDLE Center, CWRU students and researchers connect with industry partners locally and globally. By working to accelerate partner technology and product development, the SDLE Center both helps reduce the lifetime cost of ownership (LCOE) of environmentally exposed technologies, and promotes economic development for Ohio by supporting and attracting new companies and industries, which in turn help create new jobs for Ohioans.

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Collaborating Partners

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Lifetime and Degradation Research

The Solar Durability and Lifetime Extension (SDLE) Center at Case Western Reserve University (CWRU) is a world-class research center dedicated to lifetime and degradation science. Established in 2011, the SDLE (or “Sundial”) Center focuses on the durability and degradation of solar photovoltaic (PV) materials, and other environmentally exposed, long lived technologies.

In its 2010 Science For Energy Technology workshop, the U.S. Department of Energy Basic Energy Sciences program identified photovoltaic module lifetime and degradation science as an energy research priority. Researchers at the SDLE Center build on years of solar PV industry experience to address this priority, engaging students and industry partners in dynamic research programs that move beyond basic qualification testing of systems to determine actual degradation mechanisms and rates – the scientific underpinning of reliability and qualification standards. By facilitating this collaborative, applied scientific exploration, the SDLE Center pushes the boundaries of lifetime and degradation science to enable the design of better, longer lasting PV materials and systems, and accelerated, more accurate testing protocols.

Crosscutting Applications

Focusing on solar PV buildings envelope and energy efficiency technologies, the lifetime and degradation science research at the SDLE Center has broader applications to all materials. The advanced exposure techniques, rigorous evaluation processes, and quantitative degradation rate modeling performed at the Center connects materials, components, and systems to address crosscutting research challenges not only for PV, but for all environmentally exposed technologies.

SDLE Center Facilities

With its laboratory on the CWRU campus and its outdoor SunFarm nearby, the SDLE Center offers extensive facilities for University researchers and industry partners alike. Additionally, SDLE partners can avail themselves of equipment in other CWRU research centers, including the Swagelok Center for Surface Analysis of Materials (SCSAM) and the Materials for Opto/Electronic Research and Education (MORE) Center.

SDLE Lab

Sample Preparation
- Clean room with deposition and characterization capabilities
- Sample preparation lab for inspection and metallography
- Mini-module lab for sample lamination

Exposures

Light Lab:
- Newport 1-50x suns solar simulator
- Newport 1-8x suns solar simulator
- Spectrolab XT-30 100-1200x suns solar simulator

Environmental Test Chamber Lab:
- Q-Lab Q-UV-Spray chambers with condensing humidity
- Q-Lab Q-Sun Xe-3HS with condensing humidity and spray
- Q-Lab Q-Fog cyclic corrosion testing
- CSZ: 2 MCHS-3, 1 ZPH-8 ETCS
- CSZ: SPHS-100 ETC with integrated full-sun HID light rack

Evaluation
- VUV-LPLS reflectometer
- VUV-VASE ellipsometer
- Small-spot UV spectrometer
- Cary 6000i UV-Vis spectrometer with diffuse reflectance accessory
- ScatterMaster scatterometer
- Wyatt Dawn MALS Scatterometer
- HunterLabs Ultrascan Pro spectrometer
- Digital signal processing, I-V characterization, signal generation and automated testers for electrical property evaluation

SDLE SunFarm

The SDLE SunFarm provides extensive outdoor exposure capabilities, including fourteen Opel SF-20 dual axis trackers for samples and modules, with a capacity of more than 15,000 samples at 1-5x concentration, along with racking for fixed-mount modules. The SDLE Center also has collaborating partner outdoor exposure facilities in Arizona, Colorado, and Florida.

Layout of SDLE SunFarm, featuring fixed-mount modules and fourteen dual axis trackers.