Facility Factsheet

Thick Film Deposition Laboratory (TFDL)

Description:

This facility utilizes commercial deposition technology that has been modified to fit the needs of the research and development teams using the workspace. The TFDL houses equipment such as the Optomec M^3D Aerosol Jet Deposition System, the FujiFilm Dimatix Inkjet Printer, multiple Thermolyne High Temperature Furnaces, two U.S. Stoneware Ball Mills. This equipment, along with various other testing apparatuses, are used to produce prototype cells for electrochemical characterization.

The Aerosol Jet Deposition System is composed of the deposition head, ultrasonic and pneumatic atomizers, and the Process Control Module. The system provides the ability to control material deposition, substrate motion, and material processing variables. The atomization process aerosolizes inks/pastes or colloidal suspensions before deposition. Once aerosolized, the material is then layered on to the substrate. As opposed to layering the material on to the substrate by hand, this process provides unprecedented control and reproducibility by functionally controlling the layers to optimize the electrochemical performance. The Aerosol Jet Deposition System can easily alter the porosity and density of the substrates and layers in order to determine what sequence gives the best overall performance.

The developed prototype cells are sintered in the Thermolyne High Temperature Furnaces to bring the cells to the correct density. Upon sintering the prototype can then have more layers deposited or be studied through Scanning Electron Microscopy and other electrochemical characterization methods.

Purpose:

The primary purpose of the facility is the research and development of printed/deposited films from inks, paste, or colloidal suspension onto substrates (glass, polymeric, or ceramic). Once the films are deposited, studies are completed to determine the effects and benefits of the changes in deposition variables. The research done in this lab will prove the reproducibility and precision needed to increase the scale of manufacturing and provide successful commercialization techniques.

Products:

The TFDL enables researchers to create prototype materials for a wide range of electrochemical technologies. Currently, the lab produces substrates for battery and fuel cell manufacturing; however the lab enables the creation of many different materials and will provide advantages to creating electrochemical technologies now and long into the future.

Availability:

Primarily in-house and related DoD contractor research. Other U.S. Government agency, DoD contractor and commercial customer programs upon request. Contact: 937-255-4275.