

Addressing Heterogeneity in Electrode Fabrication Processes

U.S. DEPARTMENT OF

ENERGY

Energy Efficiency &
Renewable Energy

PI/Co-PI: Dean R. Wheeler (BYU)/ Brian A. Mazzeo (BYU)

Objective:

Better understand connections between fabrication conditions and undesired heterogeneity of thin-film electrodes by means of new non-destructive inspection techniques and a computer model.

Impact:

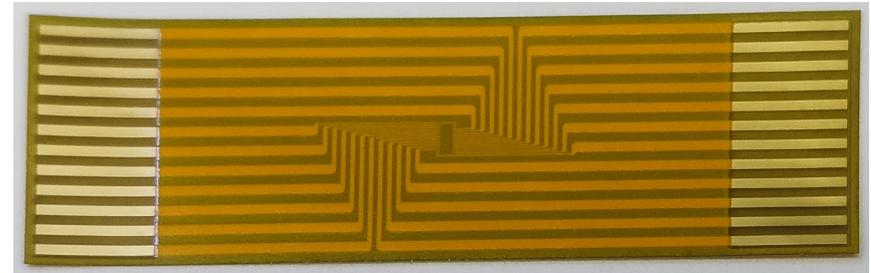
- Real-time measurement of heterogeneity will enable manufacturer quality control improvements
- Measurement tools will enable researchers to compare different electrodes and improve formulations

Accomplishments:

- Redesigned and manufactured flexible conductivity probe that improves accuracy and allow sampling of larger electrode films
- Made electronic and ionic conductivity measurements comparing pristine and cycled commercial electrodes to quantify effects of cycling on microstructure and transport performance
- Dynamic particle packing model (DPP) improved to allow modeling of coating process
- Successful proof-of-concept acoustic probe used to determine electrode film stiffness

Third-Generation Flexible Conductivity Probe

In August 2017 a new probe was introduced that allows accurate and robust conductivity measurements of larger-size electrode samples. It is made by a process that can be mass-produced outside a clean room, thus greatly reducing cost relative to previous designs and allowing for greater commercialization of the technology.



FY 18 Milestones:

- Complete flex probe prototype
- Integrate the flex probe with existing high-precision positioning system and make measurements
- Demonstrate DPP model predictions of effective conductivities
- Complete prototype of acoustic probe and model

FY18 Deliverables:

Quarterly reports, scientific publications, and testing apparatuses to evaluate new measurement approaches

Funding:

— FY17: \$350,000; FY18: \$350,000