Morphology Control of LSCF Powders and Reliable Lab-scale Evaluation for Enhanced SOFCs Electrode Performance

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**Motivation**
- Understanding & optimizing electrochemically active zone in solid oxide cells electrodes are indispensable to maximize performance.
- The relative role and hierarchy of materials properties and electrode structure corresponding to cell/stack performance reliability need to be identified.

**Cost-Effective Powder Synthesis with Morphology / Chemistry Control**
- Mass-producible powder synthesis via co-precipitation using continuous stirred tank reactor (CSTR) - well established in battery industry.

**Potential Product**
- LSCF powder from (Co0.2Fe0.8)O precursor.

**Toward Enhanced Performance**
- Porosity/particle connectivity control.
- Chemistry/Current collection control.

**Reliable Lab-scale Evaluation**
- Proper combination of mesh spacing and porous electrode thickness is required to ensure reliable $R_{exch}$ determination.
- Porous metal current collecting layer could misleading evaluation.

**Argonne’s Capabilities**
- Fundamental materials studies to cell/stack development for SOFC technology.
- Cutting-edge facilities and scientific tools for in-depth research at the materials level that drives technological breakthroughs.

**Acknowledgement & References**
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- Joseph Stoffa, SOFC project manager
- Debalina Dasgupta, SOFC project manager
- Shalesh Vora, Technology Manager, SOFC Program.

**Potential Extension**
- Tailored electrode architecture to alleviate oxygen partial pressure build-up at SOEC air electrode.
- Targeted synthesis of core-shell structured powder for SOFC/SOEC interconnect coating.

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Acknowledgement & References
High Bi$cosh$ = Sr for Argonne Leadership Computing Facility (ALCF)* morphology determination The FeMaximized electrical Argonne’s Capabilities Department of Chemistry, Illinois Institute of Technology. Chemistry/Current Porosity Mass Reliable Lab Understanding & optimizing Enhanced adhesion = $R_{exch}$ reliability. This work was supported by the US DOE, Office of Fossil Energy & Carbon Management, “Solid Oxide Fuel Cell Manufacturing in Support of Office of Fossil Energy” program through Argonne Nat. Lab. under FWP No. 27327.1
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