**Small angle x-ray scattering studies of solid oxide fuel cell cathodes**

Argonne National Laboratory

Kee-Chul Chang1, Brian J. Ingram2, E. Mitchell Hopper1,

Shiwoo Lee3, Hoydoo You1, Paul H. Fuoss1\*

1Materials Science Division, Argonne National Laboratory

2Chemical Sciences and Engineering Division, Argonne National Laboratory

3National Energy Technology Laboratory

e-mail:\* [fuoss@anl.gov](mailto:fuoss@anl.gov) Phone: 630-252-3289

Understanding the correlation between cathode/anode microstructure and electrochemical properties is crucial for improving solid oxide fuel cell (SOFC) performance. Small angle x-ray scattering (SAXS) probes electron density fluctuations arising from voids and infiltrates on size scales that are well matched to sintered porous powders used for SOFC. SAXS is non-destructive and has advantages of less demanding sample size constraints, large sampling volume, and *in operando* studies compared with microscopy based techniques.

We demonstrate the feasibility of using SAXS to characterize cathode powders and infiltrates on electrolyte backbone structures. Using in situ SAXS, we were able to follow the evolution of infiltrate precursors at different annealing temperatures. Our results show the advantages of SAXS in characterizing multi-scale cathode materials under SOFC operating conditions.