Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

In Situ Neutron Diffraction of Rare-Earth Phosphate Proton Conductors Sr/Ca-doped $LaPO_4$ at Elevated Temperatures[1] AMAL AL-WAHISH, University of Missouri Research Reactor (MURR), USAMA AL-BINNI, Department of Physics and Astronomy, University of Washington, C. A. BRIDGES, A. HUQ, Z. BI, M. P. PARANTHAMAN, Oak Ridge National Laboratory, S. TANG, Central South University, P.R.China., H. KAISER, University of Missouri Research Reactor (MURR), D. MANDRUS, Department of Materials Science and Engineering, The University of Tennessee. Materials Science and Technology Division, Oak Ridge National Laboratory — Acceptor-doped lanthanum orthophosphates are potential candidate electrolytes for proton ceramic fuel cells. We combined neutron powder diffraction (NPD) at elevated temperatures up to 800 °C, X-ray powder diffraction (XRD) and scanning electron microscopy (SEM) to investigate the crystal structure, defect structure, thermal stability and surface topography. NPD shows an average bond length distortion in the hydrated samples. We employed Quasi-Elastic Neutron Scattering (QENS) and electrochemical impedance spectroscopy (EIS) to study the proton dynamics of the rare-earth phosphate proton conductors 4.2% Sr/Ca-doped $LaPO_4$. We determined the bulk diffusion and the self-diffusion coefficients. Our results show that QENS and EIS are probing fundamentally different proton diffusion processes.
1. A. B. al-Wahish et al., Chem. Mater. 28, 7232 (2016).
2. A. B. al-Wahish et al., Rev. Sci. Instrum. 86, 095102 (2015).
3. A. B. al-Wahish et al., J. Phys. Chem. C. 118, 20112 (2014).

[1]Supported by the U.S. Department of Energy

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Date submitted: 11 Nov 2016 Electronic form version 1.4