Contribution ID : **133** Type : **Oral**

Understanding Energy Materials Function: Neutron Diffraction of Materials Not at Equilibrium

Wednesday, 11 November 2020 13:40 (20)

The performance of functional materials central to energy devices, including rechargeable batteries, fuel cells, as well as gas separation and storage technologies, is determined largely by atomic-scale materials structure and dynamic-function relations. Many functional materials undergo structural change during use, for example to accommodate compositional change such as in rechargeable battery electrodes that reversibly host charge-carrying ions and in gas storage and separation materials that reversibly host molecular gas species. Robust characterization methods that quantitatively and accurately capture these changes are essential to the strategic design of materials with superior function, and consequently, to improving device performance.

Historically, a conflict existed between fast and detailed neutron scattering measurements of materials, particularly for measurements of materials within devices. This conflict was sometimes alleviated by using small model systems in which the material function was not representative of that in the corresponding commercially-used device. Today, advanced characterization methods that capture material changes in detail while they are occurring is possible in whole devices under real-life operating conditions, as facilitated by advances in instrumentation. This is especially true for powder diffraction, with instruments such as the high intensity neutron powder diffractometer Wombat at the Australian Centre for Neutron Scattering (ACNS) being one of the fastest of its kind globally.

This talk will give examples of real-time neutron scattering measurements of functional energy materials capturing compositional change and non-equilibrium processes, with a focus on neutron powder diffraction using ACNS's Wombat. 1-4

References:
1 G. Liang, C. Didier, Z. Guo, W. K. Pang, V. K. Peterson, Adv. Mater., 2019, 1904528.
2. C. Didier, W. K. Pang, Z. Guo, S. Schmid, V. K. Peterson, Chem. Mater. In Press, 2020.
3. J.E. Auckett, S.G. Duyker, D.R. Turner, S.R. Batten, V.K. Peterson, ChemPlusChem 2018
4. S. Duyker, V.K. Peterson, G.J. Kearley, A. Studer, C.J. Kepert, 2016

Speakers Gender

Female

Level of Expertise

Experienced Research

Do you wish to take part in the poster slam

No

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Session Classification : Award Prize Session

Track Classification : Award Prize Session