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EMU - the high-resolution backscattering spectrometer at ANSTO

EMU, the high-resolution neutron spectrometer installed at the OPAL reactor, ANSTO [1] delivers 1 eV FWHM energy transfer resolution for an accessible ± 31 eV energy transfer range. The spectral resolution is achieved by neutron backscattering from Si (111) on the primary and second flight paths, which also determines the accessible 0.35 to 1.95 $\text{\AA}^{-1}$ momentum transfer range.

Two years of user operation document strong demand for QENS characterization of microscopic diffusion processes in energy materials such as solid-state electrolytes, and increasingly in bio-related soft materials [2,3]. Over the same time frame most experiments were carried out with standard cryo-furnaces (2 to 800 K temperature range). Spectrometer beam-time access is merit-based, thus welcoming experiments beyond the first two-year 'sample', and including experiments that may require other ancillary equipment such as (existing) controlled-gas delivery, pressure, applied fields, etc.

Examples of the spectrometer capabilities will be shown, with an emphasis on QENS line shape and mean-square displacements analyses.

Scientific support is presently focused on enabling data analysis of the collected data, and on the instrumental side reaching the design 0.1 $\text{\AA}^{-1}$ minimum momentum transfer range and growing signal-to-noise ratio beyond its current $\sim 1650:1$ value.

[1] N.R. de Souza et al., Neutron News, 27, 20 (2016).

[2] D.L. Cortie et al., J. Phys. Chem. C, 121, 18762 (2017).

[3] M.K. Rasmussen et al., accepted EPJ Special Topics (2018).

Topic

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