Poster Presentation

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Structure factor measurement by 3-beam convergent beam electron diffraction

Y. Guo[1], P. Nakashima[1], J. Etheridge[1,2]

[1]Monash University, Department of Materials Engineering, Melbourne, Australia, [2]Monash University, Monash Centre for Electron Microscopy, Melbourne, Australia

It has been shown mathematically that both the magnitudes and 3-phase invariants of the structure factors of a centrosymmetric crystal can be expressed explicitly in terms of the distances to specific features in the 3-beam convergent beam electron diffraction (CBED) pattern [1].This theoretical inversion can be implemented experimentally, enabling direct observations of 3-phase invariants and the approximate measurement of structure factor magnitudes. This method then enables a different approach to crystal structure determination, which is based on the observation of phases, rather than the measurement of amplitudes. It has been shown that by inspection of just a few phases using 3-beam CBED patterns, centrosymmetric crystal structures can be determined directly to picometre precision without the need to measure magnitudes [2]. Here, we will explore a different approach for measuring structure factor magnitudes from 3-beam CBED patterns. It has been demonstrated that the relative structure factor magnitudes can be determined directly from the ratio of the intensity distributions along specific lines within the CBED discs [3]. We will investigate the potential of using this approach for the relatively fast measurement of approximate structure factor magnitudes from nano-scale volumes of crystals.

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