# Quantitative Methods for the Determination of Nanostructures using Sub-Angstrom Electron Probes

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## ABSTRACT

The advent of electron probes smaller than one Angstrom in diameter is enabling data to be obtained selectively from atomic-scale volumes of a specimen. This offers the prospect of extracting information about the type, position and bonding of specific atoms within a specimen. This talk will describe the development and application of three different methods in quantitative imaging and diffraction using sub-Angstrom electron probes and will illustrate these with a range of applications, such as the measurement of the shape and surface facets of nanoparticles; the atomic structure of alloy precipitates; the long-range diamond and chessboard nanostructures in lithium-based titanate perovskites; and the bonding charge distribution in aluminium.

The talk will cover briefly methods to interpret the absolute intensity and contrast in atomic-resolution annular dark-field (ADF) scanning transmission electron microscope (STEM) images, without recourse to any adjustable parameters; new STEM imaging methods using detectors located in a plane conjugate to the specimen, rather than the diffraction plane; and quantitative methods in convergent beam electron diffraction for the determination of structure and bonding in crystals.