Coherent X-ray Diffraction mapping of strains in Nanocrystals

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Coherent X-ray Diffraction is an analytical method that exploits the high coherence of X-ray beams from the latest synchrotron sources, such as the Diamond Light Source in the UK. When the entire sample is smaller than the beam coherence, its diffraction pattern contains interference from all parts of the sample in the form of a complex speckle pattern [1]. These data can be oversampled, hence phased, hence inverted to a real-space image of the crystal. If the diffraction pattern is collected around a Bragg peak, the image contains projections of the internal strains of the crystal. In this talk, I will show examples of CXD applied to semiconductor nanowires, ZnO and metals. I will outline our plans to extend this to understand the effects of lithographic processing and microfabrication, seen through the strain imaging.

[1] Ian Robinson and Ross Harder, Nature Materials 8 291-298 (2009)