Coherent X-ray Diffraction for the Study of Microstructural Evolution

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X-ray Diffraction from disorder in materials is usually considered to be a powerful method of obtaining statistical averages of structure on a variety of length scales. When a coherent X-ray beam is used, these averages can be undone in a way to allow access to new information, for example concerning the time-scale of fluctuations. Applications of this new technique to be presented here are: evolution of oxide growth on silicon, antiphase domain structure in Cu_3Au, and the shapes of gold nanocrystals.