LEM3 LABORATOIRE D'ÉTUDE DES MICROSTRUCTURES ET DE MÉCANIQUE DES MATÉRIAUX

UNIVERSITÉ DE LORRAINE

cnrs

Labex DAMAS

2nd Workshop « 3D Microtexture analysis »

LEM3 - Labex DAMAS

Metz, October 13-15, 2015

Slice Thickness Measurement, Control and Stability Issues During Focused Ion Beam Milling

Ken Mingard, Helen Jones, David Cox and Mark Gee

National Physical Laboratory, Hampton Road, Teddington, Middlesex, TW11 0LW, UK

It is easy to assume that a visual reconstruction of a stack of images produced in a Focused Ion Beam microscope (FIB) is a fairly accurate representation of the true 3D structure and subsequently carry out measurements based on these data. However, most three-dimensional reconstructions of microstructures produced by FIB milling usually assume a uniform slice thickness with flat and parallel surfaces. We all often choose a software setting which states that the ion beam will cut a certain value for the slice thickness and then do not check that this value has been achieved. Even if the average slice thickness is achieved, how much does it vary from slice to slice, and is it constant across the whole area of the cut? Measurement of the actual slice thickness and profile is difficult, so it is often simply ignored. These issues arise when a sample is (nominally) static, but the problems become acute when samples have to be moved between milling and imaging/mapping conditions.

The talk will discuss the use of artificial 3D structures of known geometry to measure the full 3D profile of a sequence of slices produced by FIB, both with static and moving stage positions. It will discuss ways of assessing issues of ion beam shape and stability, as well as considering how stage stability and image drift can influence results.