MONASH University
Centre for Electron Microscopy

# SEMINAR

## Field mapping in the TEM by off-axis electron holography.


## Dr. David Cooper

**CEA LETI, Minatec Campus, Grenoble, France.**


*Friday 6 September, 2013*
*11am – 12noon*
*Science Lecture Theatre S1, Building 25*

## Abstract


Off-axis electron holography is a unique transmission electron microscopy-based technique that allows the electrostatic, strain and the magnetic fields in and around a specimen to be measured with nm-scale resolution. This makes it an extremely powerful method for the characterisation of semiconductor devices. The reduction in the dimensions of semiconductor devices means that information about the strain fields and active dopants becomes more important in order to understand how these properties affect their electrical performance. In this presentation we will show how electron holography combined with careful specimen preparation can be used to routinely measure the strain and electrostatic potentials in conventional semiconductor devices. We will demonstrate how electron holography has been used to measure the potential in a range of different types of specimens. We will also show how by operating our FEI Titan Ultimate at 80 kV we can provide atomic resolution potential maps of graphene.

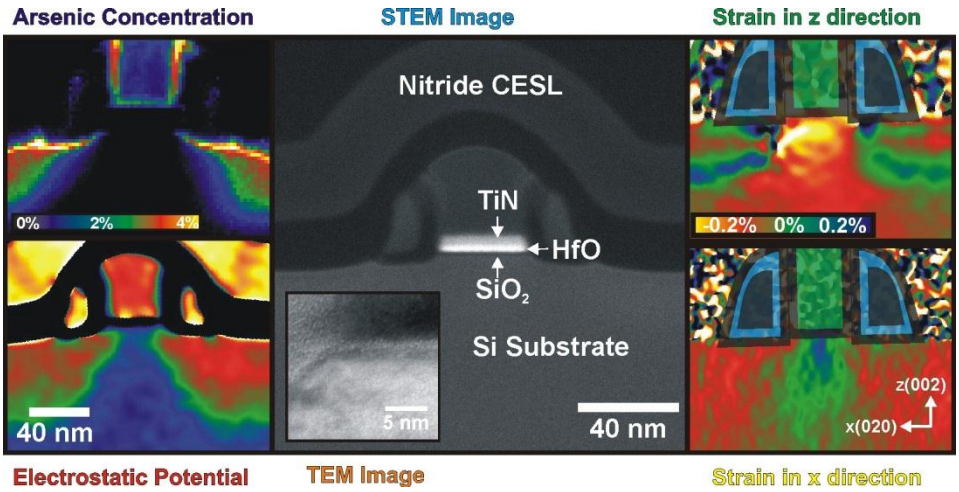


Figure 1: shows an arsenic chemical map acquired by EELS, a STEM image, strain maps acquired by dark field electron holography and a map of the electrostatic potential that has been acquired from the same TEM specimen.

We will also present a range of different TEM---based strain mapping techniques such as nanobeam diffraction (NBED) and the geometrical phase analysis (GPA) of high resolution STEM images. These will be compared to dark---field electron holography, which is also used for strain mapping. We will demonstrate all of these techniques applied to a range of different specimens and then critically evaluate the performance of each one.

Convenor: Professor Joanne Etheridge
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http://fsd.monash.edu.au/files/claytoncolour_0.pdf