M06.EE Interfaces, Thin films and Multilayers

Chair: P. Fewster
Co-Chair: S. P. Sen Gupta

Attendance: 116

This was a very lively session with five excellent talks covering a range of leading work in various areas with a true international mix. Ingo Kegel (Munich) instead of his co-worker Hartmut Metzger, who was unable to attend, gave the first talk. The presentation concentrated on the detailed information that can be extracted from semiconductor quantum dots from vertical ordering in periodic structures to the composition of these nanometre scale features. The composition is obtained from measurement of the strain and interference effects from the dot and the underlying substrate, using the variable penetration of grazing incidence scattering. Roger Cowley (Oxford) gave the following presentation on the measurement of roughness at metallic and semiconductor epitaxial interfaces. For Nb on sapphire the roughness worsened with increasing thickness, yet the measured correlation length is increased suggesting that any short correlation lengths are maintained close to the interface. For GaSb on GaAs he found a regular array of dislocations which differ in orthogonal directions indicative of orthorhombic distortion in GaSb.

Milan Sanyal (Calcutta) started with an introduction of the problems in retrieving the electron density profile from specular reflectometry scans. However from these methods, especially using Fourier methods they do lead on to iterative fitting methods. Examples including semiconductors and Langmuir-Blodget multilayers were presented including further in-depth analyses of lateral correlation lengths. Ivan Vartanyants (Moscow) presented work on the new developments in reconstructing the surface morphology using highly coherent X-ray sources. For a normal source the profile from rough surfaces will be broad and smooth, whereas for a coherent source this will become very jagged from the interference. The phase shift due to the heights of the scattering surface creates this pattern which can be reconstructed using model structures and phase retrieval algorithms. This work is at comparatively early but at a very exciting stage. Robert Feidenhansl (Riso) illustrated methods of analysing the interfacial structures from directly bonded Si wafers. The principle comes from the small twists that create moiri patterns or periodic arrays of dislocations and hence satellites. The sample has to be thinned to overcome significant absorption of the weak scattering. The satellite structure factors are fitted to a model and the detailed atomic structure (e.g. close to screw dislocations) can be obtained.

Paul F Fewster