

TECHNICAL PROGRAM

Electron Beam Imaging

Monday AM Room: Glessner Auditorium
September 14, 2009 Location: Oglebay Resort & Conference Center
Session Chair: Marek Skowronski, Carnegie Mellon University

12:00 PM-12.15 PM

Dislocations in Si-Doped LEC GaAs Revisited: a Spectrum Image Cathodoluminescence Study

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The understanding of the role of impurities is crucial to semiconductor device technology, since all the devices are engineered by the selective incorporation of impurities. However, the incorporation of these impurities to the lattice and the resulting free charge concentration depend on the interaction with native defects. Dislocations in Si-doped substrates were studied in the nineties using highly sensitive DSL (Diluted Sirtl-Like) etching, SEM-EBIC (Electron Beam Induced Current) and microPL techniques. Both grown-in (G) dislocations, and grown-in dislocations glided (GS) by thermal stresses during post growth cooling were investigated aiming to understand the interaction between the dislocations and the doped GaAs matrix. CL spectrum imaging allows revisiting this problem supplying information about the defects forming the Cottrell atmospheres, and how they are distributed. By using a CCD multichannel detector it is possible to obtain the full spectral information over a selected area with submicrometric spatial resolution. The local spectra corresponding to the different regions of the dislocation atmosphere are available, allowing the identification of the different defects responsible for the luminescence emission. On the other hand, the use of fitting routines allows mapping the distribution of the different defects and impurities, providing a full scenario of the Cottrell atmosphere. The CL images are complemented with etching depth (using DSL) images obtained by Phase Stepping Microscopy.