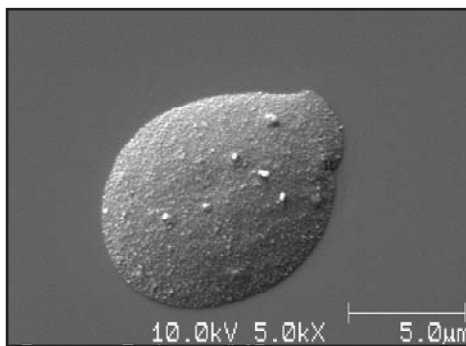


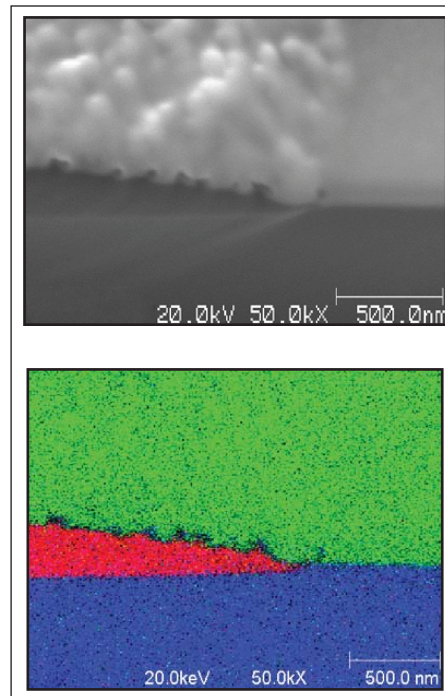
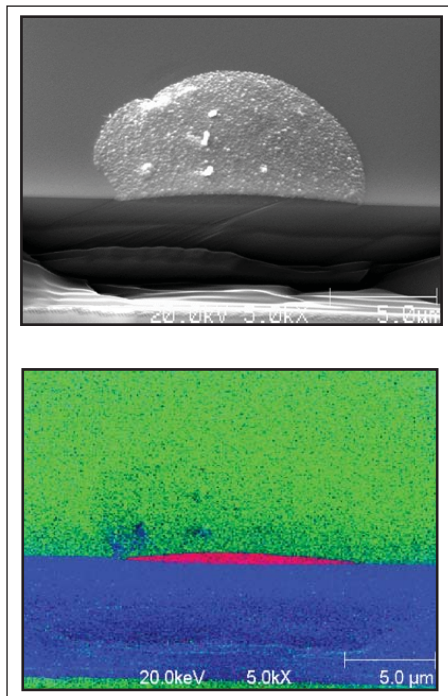
## Discussion

Optical inspection for defects on semiconductor wafers is only completed after select process steps. Thus, some of the defects become buried prior to their detection. The small size of many of these buried defects requires that they be exposed by etching or cross-sectioning for effective and accurate analysis using Auger electron spectroscopy. Auger is ideal for compositional analysis of these small defects because of its high spatial resolution. The SMART-Tool combines high performance Auger capabilities with FIB (Focused Ion Beam) for in-situ cross-sectioning of defects and with EDS (Energy Dispersive X-ray Spectroscopy) for analysis of larger defects and structures. FIB, Auger and EDS can be performed on a buried defect without having to reposition the wafer, providing efficient and effective defect identification to quickly solve process problems or recover from yield excursions.



SEM of defect prior to in-situ FIB cross-sectioning.

Inspection after CVD deposition of 500nm of W silicide on a 300mm Si wafer revealed 10 micron "bubble" defects. Auger and EDS analysis of the surface showed no compositional difference relative to the normal W silicide film. An in-situ cross-section of the defect was made with the FIB on the SMART-Tool. Subsequent Auger analysis shows that the defect was C contamination that formed a droplet on the Si wafer surface prior to W silicide deposition. This indicates a contamination from a wet bench operation or an insufficient rinse prior to CVD deposition.



SEM images and Auger maps of the bubble defect after in-situ FIB cross-sectioning. The Auger data were acquired without repositioning the sample.

Green = W    Red = C    Blue = Si



*EAG's 300mm whole-wafer Auger, FIB, and EDS SMART-Tool*

*SMART-Tool™ is a registered trademark of Ulvac-PHI.*

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