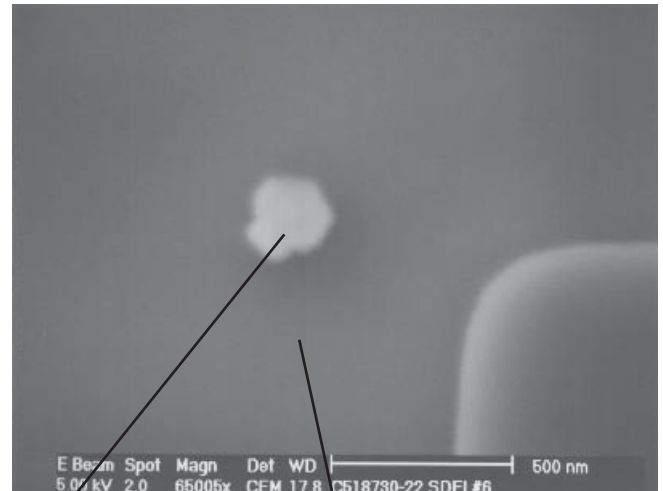


**AN 342****Analysis of a 0.2  $\mu\text{m}$  Surface Defect Auger Electron Spectroscopy vs. Energy Dispersive X-ray Spectroscopy**

May 7, 2007 (Version 3.0)

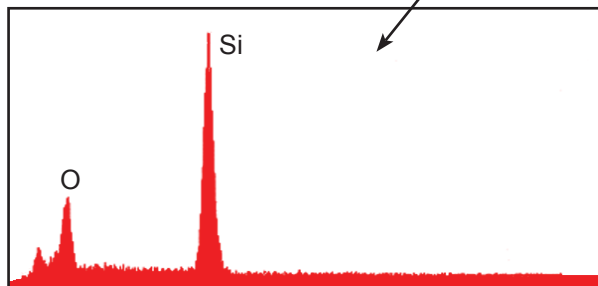
**EDX**

A submicron defect on a 200 mm product wafer was examined first with Energy Dispersive X-ray (EDX) spectroscopy. EDX analysis found silicon oxide. Carbon, attributed to contamination from the analysis tool, was also detected.

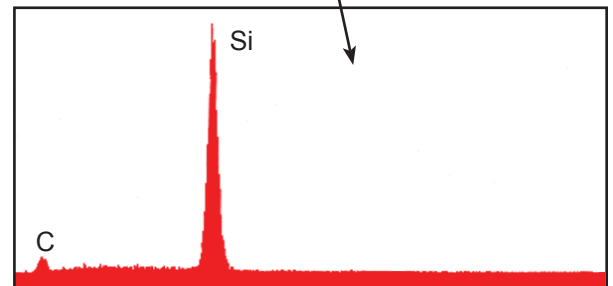


Secondary electron micrograph.

EDX data on the defect

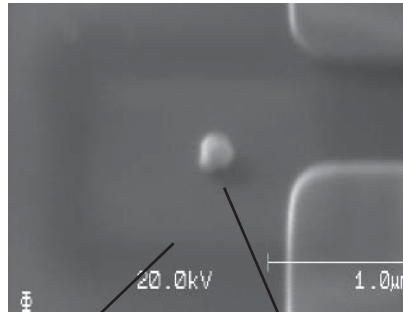
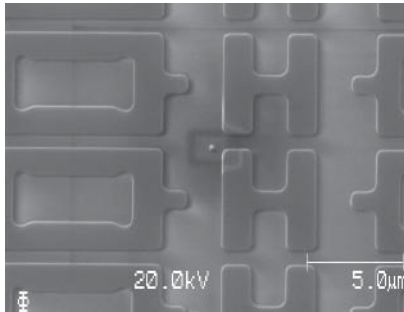


EDX data off the defect

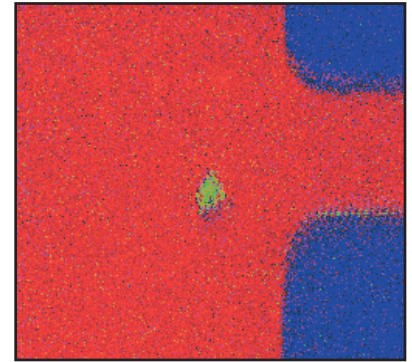


## AES using the PHI SMART-200

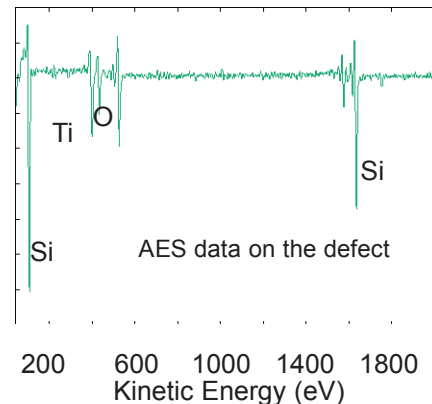
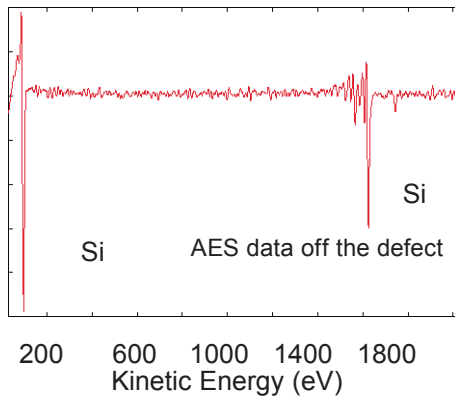
The same defect was examined with Auger Electron Spectroscopy (AES) using the PHI SMART-200 tool. Utilizing the surface-sensitive and small area analysis capabilities of Auger Electron Spectroscopy (AES), the PHI SMART-200 identified titanium on the defect in addition to the silicon and oxygen detected by EDX. This analysis indicates that the titanium contamination was introduced by a process tool after the decomposition of the silicon oxide layer and before the plasma etching of that layer. Without the additional information provided by AES analysis with the SMART-200, titanium would not have been detected and the source of the defect would not have been identified correctly.



Secondary electron micrograph at low magnification (left) and at high magnification (right).



AES Elemental Map: Titanium (Green), Elemental Silicon (Red) and Silicon Nitride (Blue).



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