



Identifying Organic Defects with the Quantera Scanning X-ray Microprobe

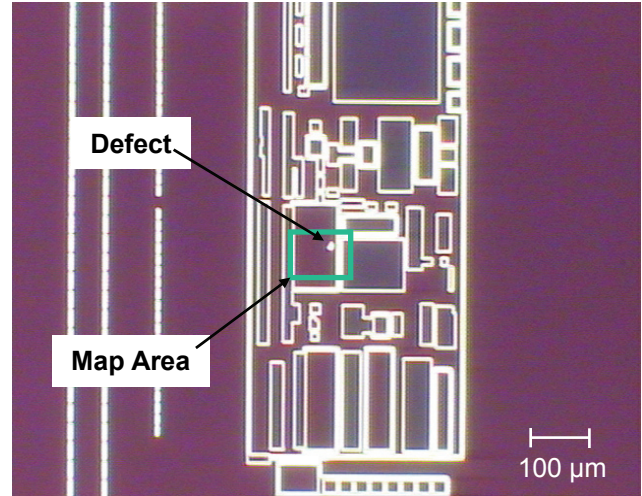
Introduction

Determining the composition of defects is a critical part of defect sourcing and yield enhancement.

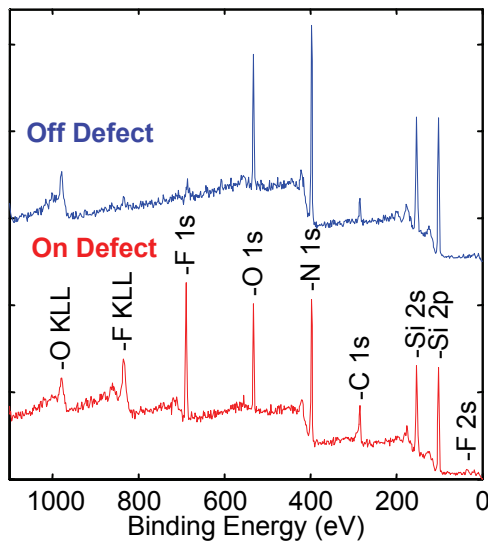
In this example, the unique ability of the Quantera Scanning X-ray Microprobe to characterize 10 μm diameter features, facilitated the identification of organic particles that were detected after a wafer clean.

Micro-area Spectroscopy

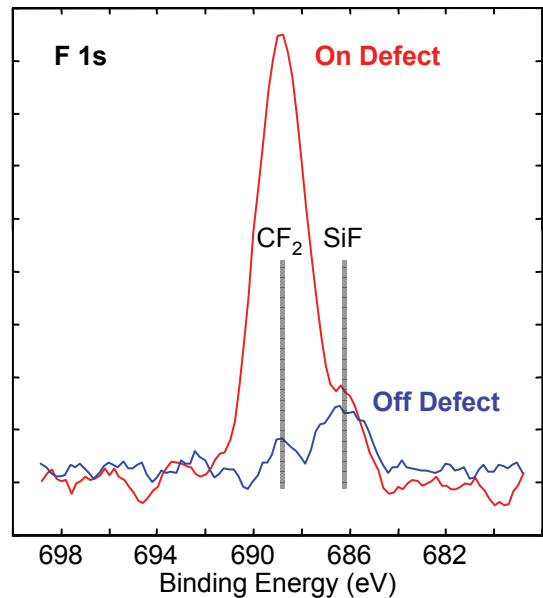
The defect was located optically with the Quantera's sample positioning station. Using an 8 μm diameter x-ray beam XPS survey spectra were collected on and off the defect area. The survey spectra show the defect to contain a large amount of F.



Optical image of an organic defect obtained with the Quantera's sample positioning station



Survey spectra obtained in a few minutes using an 8 μm diameter x-ray beam detected a large amount of fluorine in the defect area



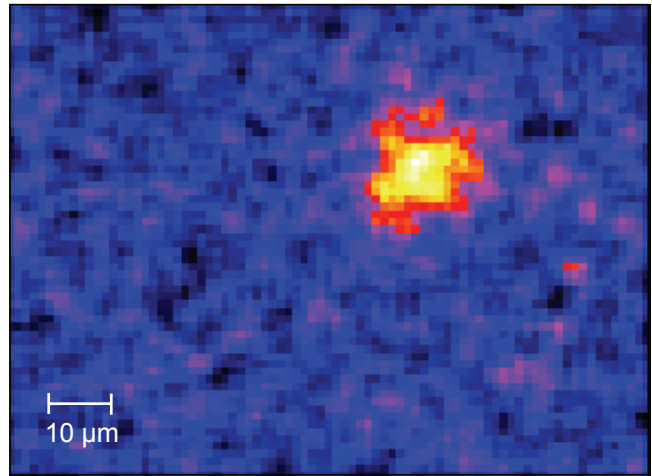
High resolution F 1s spectra show the presence of a fluorocarbon on the defect and a SiF process residue on the wafer.

Surface Composition (Atom %)		
Element	On Defect	Off Defect
Nitrogen	29.8	40.7
Silicon	24.0	32.4
Oxygen	13.1	17.2
Carbon	16.6	8.5
Fluorine	16.5	1.1

Summary

10 μm organic particles were detected by an optical defect detection tool and relocated with the Quanterra's sample positioning station. XPS spectra collected on and off of the defect, with an 8 μm diameter x-ray beam, showed more carbon and fluorine to be present on the defect. A fluorine map verified the correlation between high fluorine concentration and the defect. High resolution fluorine 1s spectra show the defect to be a fluorocarbon material and identify the small amount of fluorine on the wafer as a SiF process residue.

The unique microprobe design of the Quanterra provides SEM-like ease of use and the highest sensitivity available for micro-area spectroscopy. Complete survey spectra and high resolution spectra provide rapid identification of unknown contaminants, accurate quantification, and detailed chemical state information.



A Fluorine map confirms the correlation of high fluorine and the defect



Quanterra Scanning X-ray Microprobe



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