



Micro-XPS of Contamination on Read/Write Heads

Introduction

XPS (X-ray Photoelectron Spectroscopy) is widely used to analyze contamination on hard disks and read/write heads because of the relative ease with which quantitative chemical state information can be obtained from thin surface layers. The PHI Quantum 2000 Scanning X-ray Microprobe has increased the utility of XPS for this application by reducing the minimum useable analysis area to less than 10 μm . The 10 μm analysis area is achieved by using a focused and scanned x-ray beam. This x-ray microprobe capability facilitates a point-and-click, multi-point spectroscopy capability that is unique in the XPS market place. The optical image in Figure 1 was obtained using an integrated optical imaging system called the Sample Positioning Station (SPS). Analysis points or imaging areas can be defined directly on the optical SPS image, x-ray induced secondary electron images (SXIs) or photoelectron maps.

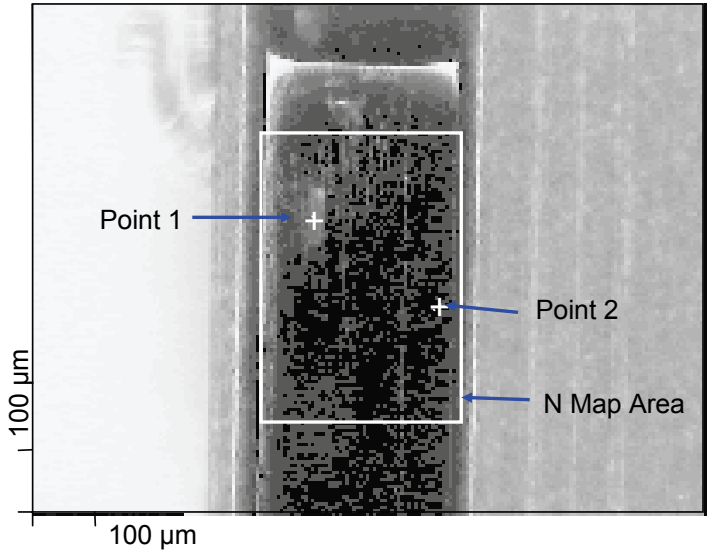


Figure 1. Sample Positioning Station image with multiple analysis points defined on and off of a smear on the read/write head.

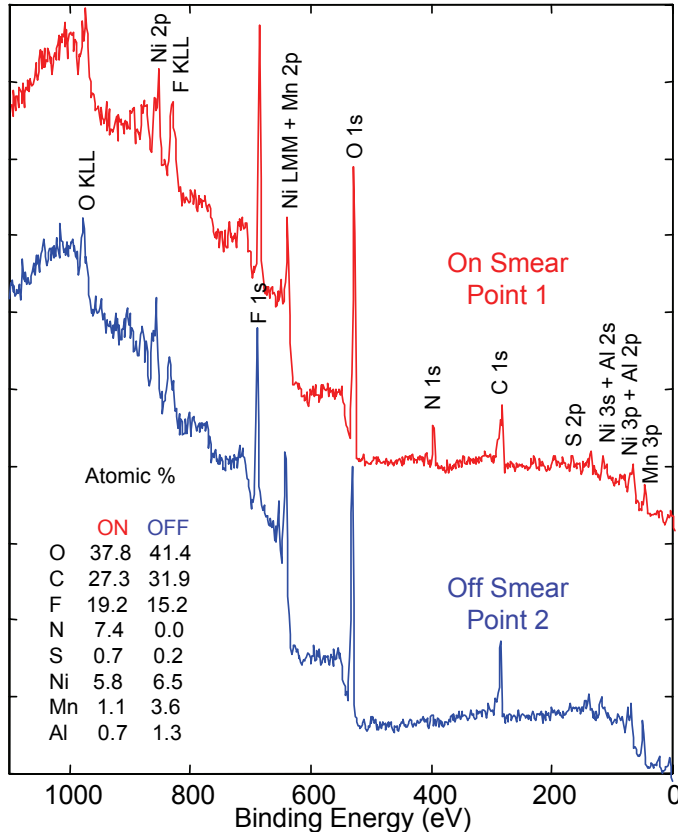


Figure 2. Survey spectra obtained in 10 minutes using a 10 μm diameter x-ray beam, on and off the smear. Note the N and S detected on the smear.

Summary

Survey spectra were collected on and off the smear using a 10 μm diameter x-ray beam (Figure 2). The total analysis time was 10 minutes per point. The data from the smear shows the presence of an organic material which contains significant amounts of N and S. The binding energy for N is typical of that for an amine and the S for that of a sulfate. Following the spectral analysis a N map was collected from the area shown in Figure 1. The N map (Figure 3) reveals the true size of the smear, which is not easy to determine from the optical image. In summary, we have shown that the Quantum 2000 Scanning X-ray Microprobe can efficiently locate and identify contaminants from small areas on read/write heads, providing quantitative chemical state information.

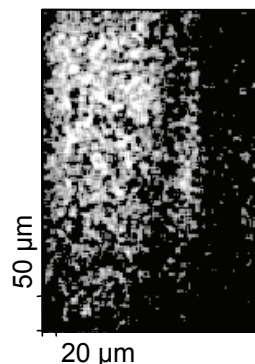


Figure 3. Nitrogen (N) map from the area defined in figure 1, showing the shape of the smear on the head.



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