

Analysis of Micromachined Devices

Key Words

- Surface Analysis
- High Spatial Resolution X-ray Photoelectron Imaging (XPI)
- Rapid Spectral Information

Micromachined devices (MMD's) are rapidly establishing themselves in sensor and micro-optical technologies. The fabrication of these devices uses techniques which are well established in the semiconductor industry.

Samples are prepared from a silicon wafer onto which a silicon nitride layer is grown to a thickness of about 0.3 μm . Optical lithographic and wet etching techniques are then applied to the material to obtain distinctive patterns on the sample to a depth of approximately 12 μm .

The feature size of these devices is such that a spatial resolution of about 1 to 2 μm is required to produce satisfactory images.

Thermo Scientific ESCALAB 250 is particularly suited to the analysis of micromachined devices because of its high spatial resolution.

Following the spectral acquisition, X-ray photoelectron images were collected from each of the major constituents over a field of view of 250 μm . The oxygen and nitrogen images are shown, along with an image overlay.

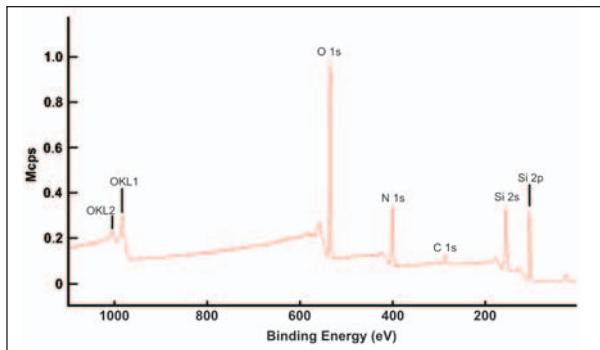


Figure 1: Large area XPS analysis, using monochromated Al K α radiation, produced this spectrum in about 20 seconds. The surface was found to consist of Si, O and N, along with a small quantity of C impurity.

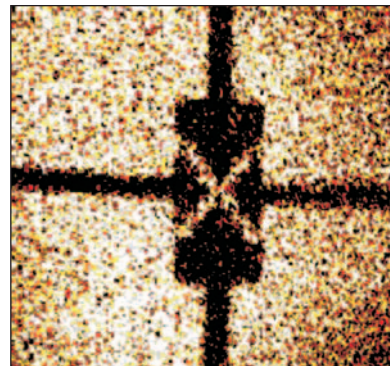


Figure 2: N 1s X-ray Photoelectron Image (peak-background) 250 μm field of view

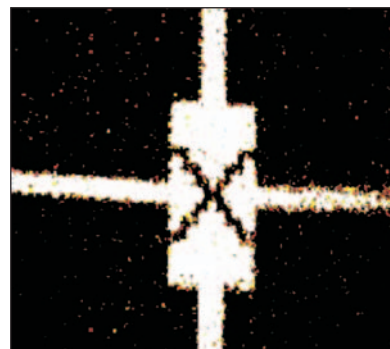


Figure 3: O 1s X-ray Photoelectron Image (peak-background) 250 μm field of view

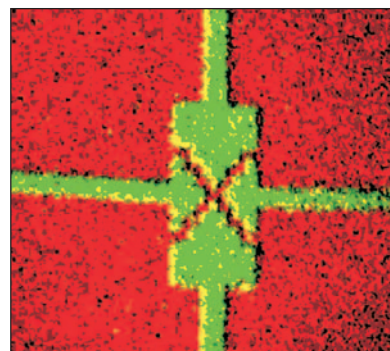


Figure 4: N 1s and O 1s overlay image

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