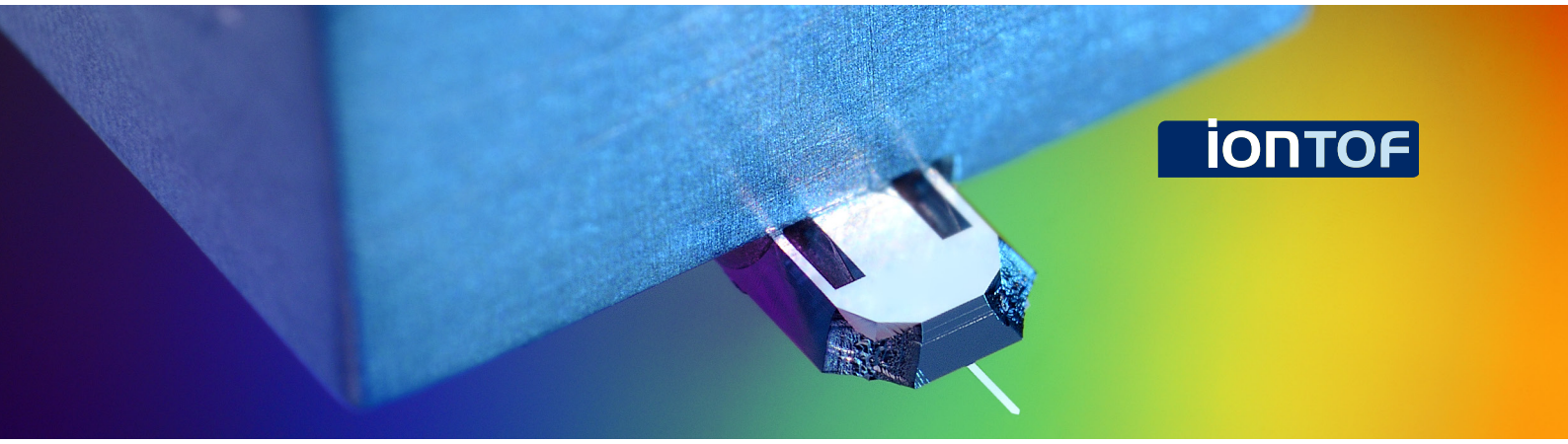

2 5

New TOF-SIMS / SPM Combination

Three-dimensional SIMS imaging

Information concerning chemical composition, physical properties and the three-dimensional structure of materials and devices at the nanometer scale is of major importance for new developments in nanoscience and nanotechnology. In a 3D TOF-SIMS measurement the initial topography of the sample surface as well as topographic changes during the experiment cannot be easily identified.

Scanning Probe Microscopy (SPM) provides complementary information about the surface topography and can also be used to measure the physical properties of the analysed sample.

The combination of these two techniques renders true, in-situ, three-dimensional chemical imaging possible.

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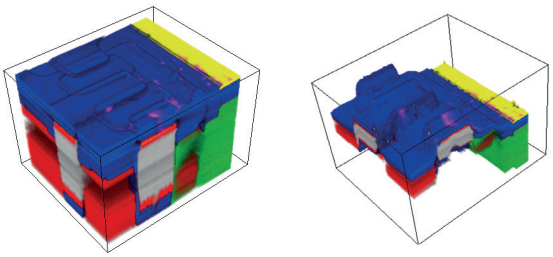
True 3D chemical imaging of a TFT pixel

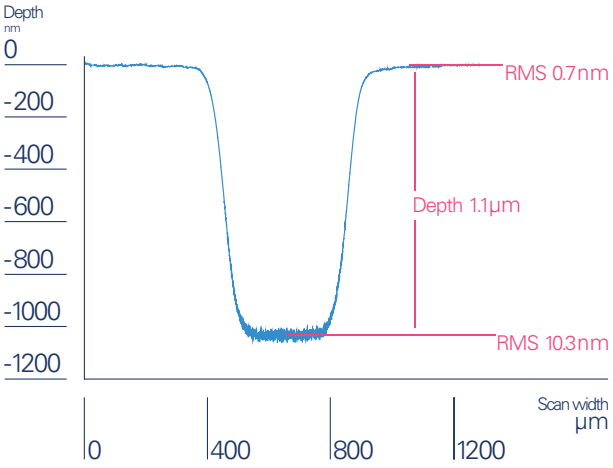
The example below shows a three-dimensional analysis of a TFT display pixel. The display has a strong initial surface topography which leads to an incorrect representation of the chemical composition, if only TOF-SIMS data are used. By combining the chemical information of TOF-SIMS with the dimensional information of SPM a true three-dimensional chemical image can be generated.



Three-dimensional analysis of a TFT display pixel. The image on the left shows the TOF-SIMS data without dimensional correction. The image on the right shows the TOF-SIMS data with the SPM dimensional correction.

SPM profiler mode for full sputter crater measurement

The SPM module of the new TOF.SIMS NCS also allows for detailed analysis of large sputter craters. In the so-called surface profiler mode multiple SPM scans are stitched together to measure long SPM line scans. This unique SPM mode is extremely valuable to precisely determine the depth of sputter craters or to measure crater roughness on the nanometer scale.



SPM profiler scan of a 1.1 µm deep sputter crater in silicon (RMS outside crater: 0.7 nm, RMS crater bottom: 10.3 nm)