● Three-dimensional analysis by TOF-SIM

TNE0006

Overview

In Time-of-Flight Secondary Ion Mass Spectrometry (TOF-SIMS), a separate sputter etching mirror (O_2, Cs) is provided apart from the primary ion mirror. Analysis in the depth direction is performed by repeated sputter etching and normal measurement. While analysis in the depth direction can also be performed by dynamic SIMS, AES and XPS (ESCA) etc, TOF-SIMS offer the following advantages over the other methods:

- Allows data collection without restrictions on the number of components. (when both positive and negative polarities are measured)
- Allows three-dimensional imaging, and the extraction of two-dimensional images for any given location.
- Allows the extraction of a profile for any given location in the area under analysis.

Table1. Features of different methods

	TOF-SIMS	FE-AES	XPS	SIMS
Detection sensitivity	○	△	△	◎
Addition of components after measurement	○	×	×	×
Minimum size and maximum depth	Several μm	<1 μm	50 μm	Tens of μm
Under actual level conditions when measuring in depth direction	Several μm			

Example: Three-dimensional analysis of TFT element

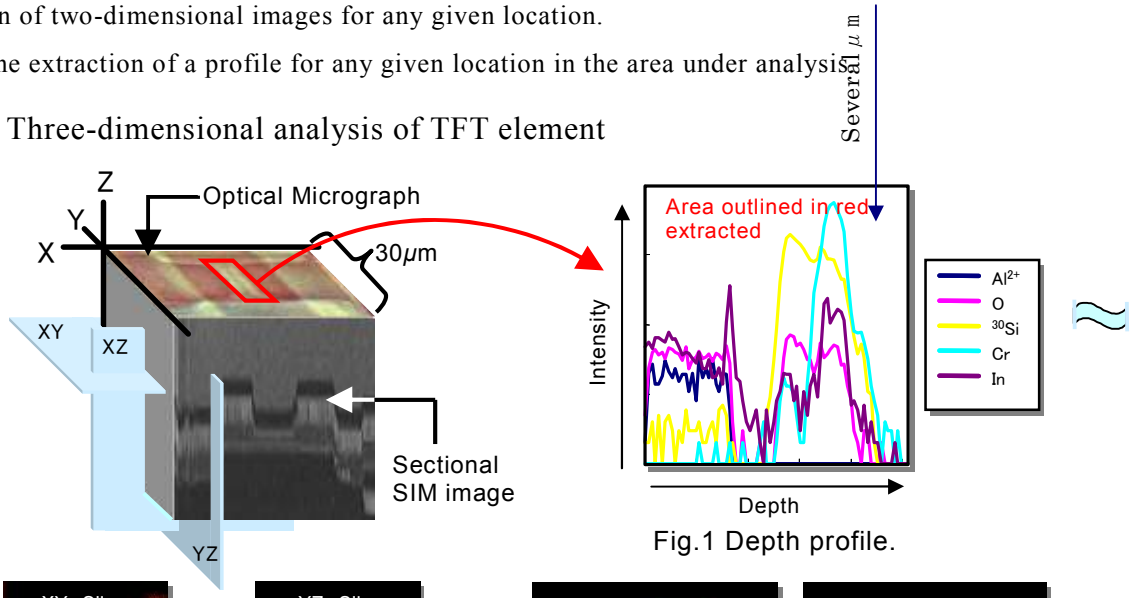

Fig.1 Depth profile.

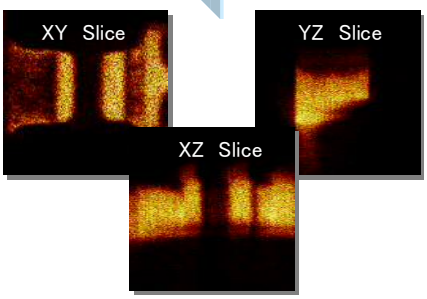

Fig.2 Two-dimensional slice images (Cr^+).

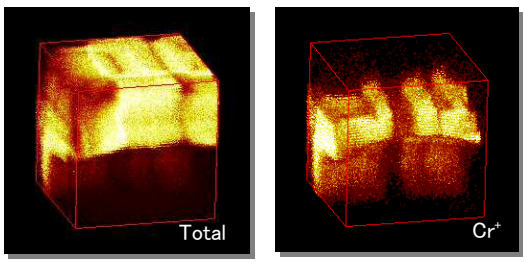

Fig.3 Three-dimensional images.

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