【총회초청】

Recent Developments in TOF-SIMS Application to Life Science and Nanotechnology

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Time of flight secondary ion mass spectrometry (TOF-SIMS) combines high lateral and depth resolution (50 nm and 1 nm respectively) with the extreme sensitivity and unique variety of informations (all elements, isotopes, molecules) supplied by mass spectrometry. This combination makes TOF-SIMS a most powerful technique for surface and thin film analysis, supplying informations on the chemical composition of solid surfaces and thin films, which cannot be supplied by AES, XPS or EPMA. TOF-SIMS has been successfully applied in a wide variety of different fields, ranging from microelectronics to polymers.

After a decade of instrument developmenmt, mainly driven by the demands of microelectronics, more recently the emphasis of development has changed to the sputtering and ion generation process itself. A considerable increase in elemental sensitivity has been achieved by nonresonant laser postionization of sputterea neutrals (Laser-SNMS). Changing to high mass and molecular primary ions resulted in an increase of molecular secondary ion generation from molecular surfaces by orders of magnitude. Reducing primary ion energies to the 100 eV range resulted in depth resolutions in the sub-nm range. These progresses opens new potentials for TOF-SIMS applications, in particular in life science and nanotechnology.

After a short introduction into the fundamentals of sputtering and ion formation these potentials will be demonstrated by a nunmber of examples including elemental analysis of quantum well structures, sub-μm particles, catalysts, and nanotips, as well as molecular surface mapping of phase separated phospholipid/protein membrane models and cell sections. The general capacities of TOF-SIMS and Laser-SNMS in life science and nanotechnology will be discussed.