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SIMS system for molecular imaging

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Large cluster ion beams are now widely used in not only secondary ion mass spectrometry (SIMS) but also X-ray photoemission spectrometry (XPS) for polymers and biological material analysis. Since cluster ion beams are equivalently low energy ion beams, organic molecules are sputtered with cluster ions without significant damage. Furthermore, their secondary ion emission yields are quite large compared with those obtained with monomer ions. Much progress has been made in the development of the SIMS technique in this decade, and this is now one of most powerful and useful techniques for organic surface analysis. Various primary ion beams and mass spectrometers have been developed and employed in improving sensitivity, as well as lateral and mass resolution. Both molecular depth profiling and imaging of organic materials are of interest.

We have demonstrated that massive Ar cluster beams are quite useful as primary beam in SIMS, given their reduced surface damage and fragmented ion generation. A massive Ar cluster ion beam with the diameter of 1 μm has been developed. This new cluster ion beam was combined with an orthogonal acceleration time-of-flight mass spectrometer (oa-TOFMS) to analyze crude and complicated biological sample.

The latest developments in SIMS systems will be overviewed and discussed together with possible applications

References
J. Matsuo, S. Torii, K. Yamauchi, K. Wakamoto, M. Kusakari, S. Nakagawa, M. Fujii, T. Aoki and T. Seki, Appl. Phys. Express 2014, 7, 56602