High-Resolution FIB and SIMS with a Cesium Low Temperature Ion Source

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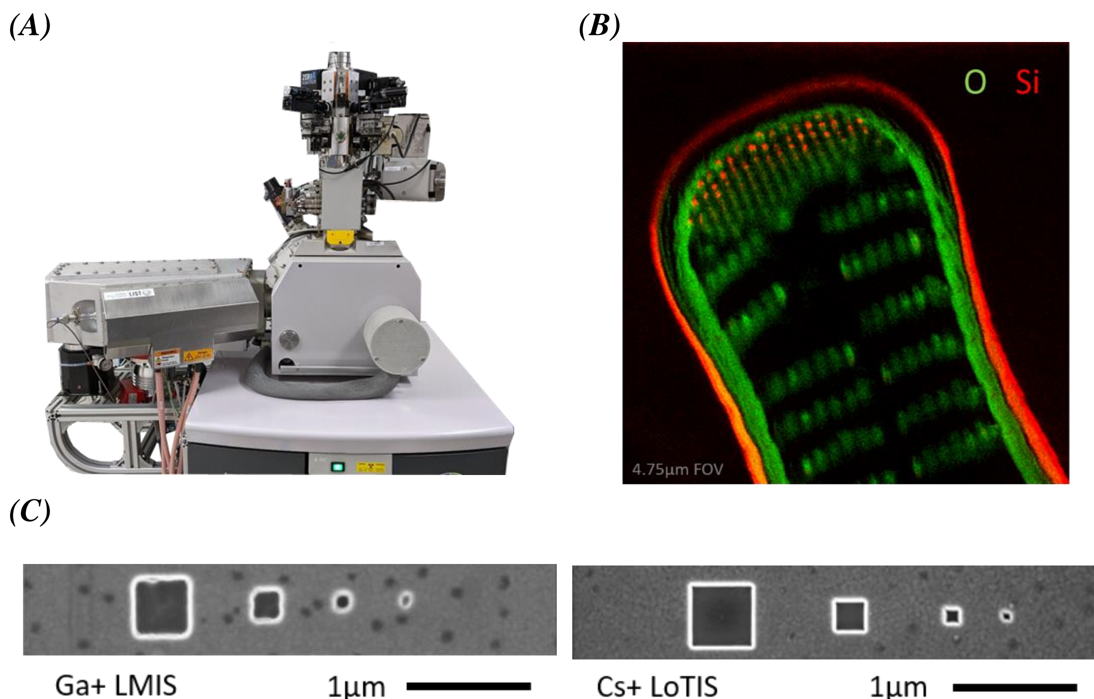
We present the latest results from focused ion beam and secondary ion mass spectrometry systems equipped with a Cs+ Low Temperature Ion Source (LoTIS)[1]. LoTIS provides a high-brightness beam which enhances the capabilities of modern FIB and SIMS systems.

In FIB nanomachining applications, LoTIS enables smaller structures to be milled by providing a smaller probe size at low currents, than gallium. It also provides enough current for preparing cross-sections and is compatible with a variety of deposition and etch-enhancement chemistries.

For SIMS applications, LoTIS enables higher-resolution elemental maps by providing an order-of-magnitude smaller probe sizes, when compared to other reactive species ion sources. The SIMS:ZERO instrument, developed at zeroK in collaboration with the Luxembourg Institute of Science and Technology (LIST), synergizes the advantages LoTIS brings to FIB and SIMS. SIME:ZERO allows for high-resolution FIB sample preparation while also providing real-time SIMS analysis for process control of the produced samples. The system is also equipped with a unique detector which allows the readout of several hundred AMU in every image pixel.



(A): FIB/SIMS instrument "SIMS:ZERO" equipped with a Cs+ Low Temperature Ion Source and a compact magnetic sector mass spectrometer for SIMS; ***(B)*** SIMS image of oxygen and silicon distributions in a diatom. Acquired with SIMS:ZERO – credit J. Audinot & O. de Castro, Luxembourg Institute of Science and Technology; ***(C)*** Comparison of FIB milling in Au film by a Ga+ LMIS (***Left***) and a Cs+ LoTIS (***Right***) – credit T. Loeber, Technical University Kaiserslautern

References

[1] A. V. Steele, A. Schwarzkopf, J. J. McClelland, and B. Knuffman. *Nano Futures*. **1**, 015005 (2017)