THE JAMSTEC NanoSIMS 50L ION MICROPROBE: APPLICATIONS TO EARTH, PLANETARY AND LIFE SCIENCES. M. Ito (Kochi Institute for Core Sample Research, Japan Agency for Marine-Earth Science and Technology, B200 Mobobe, Nankoku-City, Kochi 783-8501 Japan, motoo@jamstec.go.jp)

Introduction: On November 4, 2011 the Cameca NanoSIMS 50L ion microprobe was delivered to Kochi Institute for Core Sample Research. The instrument was settled in a class 10,000 clean room. Temperature (+- 0.3^{o}C aound a magnet) and humidity level (+-2% in the room) are well controlled. The JAMSTEC NanoSIMS will be the centerpiece of the ion imaging laboratory at Kochi Institute for Core Sample Research and will be used to investigate extraterrestrial, terrestrial and biology samples, including meteorites, Earth rocks, mineral-analogues and microbial cells in deep and ancient subseafloor sediments by a Integrated Ocean Drilling (IODP) Program.

A NanoSIMS provides several unique features as below. The strong ability of a NanoSIMS is to analyse extremely small *regions-of-interest* (achieving lateral resolutions down to 50 nm and small sputtering depth) while keeping very high sensitivity at high mass resolution. This derives from the new coaxial optical design of the primary ion sources and secondary ion extraction system, and from a new design of the magnetic sector mass analyzer. The capability of simultaneously measurement up to 7 masses, achieving more precise isotopic ratios from the same small volume, or better ion image superimposition in a imaging mode. Faraday cups are also installed into the JAMSTEC NanoSIMS, enabling to achieve the precision and external reproducibility of isotopic measurements down to the sub-permil level.

By rastering the primary ion beam across a sample surface, chemical and isotopic images (up to 7 images) can be generated. The images were processed using the JSC custom-written software for NanoSIMS (ratimagens2 program) developed by Dr. Messenger in the Interactive Data Language (IDL) [1].

Currently the specifications of beam size (Cs^{+}: ~30 nm, O^{-}: 180 nm) and beam stability in 10 min (Cs^{+}: 0.2 %, O^{-}: 0.7 %) were achieved. We have done with Si isotopic measurements for Si wafer. The reproducebilities of $^{29}Si/^{28}Si$ and $^{30}Si/^{28}Si$ ratios with EM from 10 points were 0.7 and 1.0 per mil, respectively.

Some initial results for O and Mg isotopes in meteorites and terrestrial mineral standards will be shown at the meeting.

References: M. Ito & S. Messenger (2008) *Applied Surface Science*, **255** 1446–1450.

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Figure 1. The JAMSTEC NanoSIMS 50L in a clean room (Class 10,000)