The DLR Sample Analysis Laboratory – the final countdown

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Laboratory measurements of extra-terrestrial materials like meteorites and ultimately materials from sample return missions can significantly enhance the scientific return of the global remote sensing data. This motivates the ongoing addition of a dedicated Sample Analysis Laboratory (SAL) to complement the work of well-established facilities like the Planetary Spectroscopy Laboratory (PSL) and the Planetary Atmosphere Simulation LABoratory (PASLAB) within the Department of Planetary Laboratories at DLR, Berlin. SAL is being developed in preparation to receive samples from sample return missions such as JAXA Hayabusa 2 and MMX missions, the Chinese Chang-E 5 and 6 missions as well as the NASA Osiris-REX mission. SAL is focusing on spectroscopic, geochemical, mineralogical analyses at microscopic level with the ultimate aim to derive information on the formation and evolution of planetary bodies and surfaces, search for traces of organic materials or even traces of extinct or extant life and presence of water.

SAL is currently being set up at the Institute for Planetary Research at the DLR location in Berlin-Adlershof in Germany. The cleanroom environment is on the ground floor of the main DLR building in Berlin-Adlershof with a room for support infrastructure in the basement below.

Procurement of the instruments is almost complete and first instruments are already been delivered. SAL will be equipped with a vis-IR-microscope (Bruker Hyperion 2000), a Malvern Panalytical Empyrean X-ray diffraction (XRD) system with Bragg-Brentano geometry which can be switched to parallel beam geometry, equipped with a Cu Kα source, 1Der detector and automated incident beam optics, a Field Emission – scanning electron microscope (FE-SEM), a JEOL iHP200F Field Emission – electron microprobe analyzer (FE-EMPA), petrographic and stereo microscopes, Keyence VHX-7000 3D microscope and a set of gloveboxes.

The Bruker Hyperion 2000 and the Keyence VHX-7000 3D microscope are already in operation at PSL and PASLAB and have been used recently to study Ryugu sample A0112. The JEOL iHP200F is currently setup at JEOL in Freising, Germany. Acceptance tests were successfully completed in March 2023. Commissioning, calibration, testing and initial training was completed in summer of 2023. The instrument has been used recently for work on meteorites and will be transferred to DLR in early 2024 with an additional delta commissioning planned after final installation. The X-ray diffraction system has been delivered in December 2022 and is currently in storage and will be setup as soon as the cleanrooms are ready. SEM procurement is currently under way with a delivery expected in summer of 2024.

In collaboration with the Natural History Museum (MfN) in Berlin, SAL will also have the expertise and facilities for carrying out curation of sample return material which will be made available for the whole European scientific community. DLR is already curating a 0.45 mg of Lunar regolith collected from the Luna 24 Soviet mission and the first analyses of the material are being planned.

Currently, the curatorial expertise is being developed on the existing expertise from the Meteorite Collection based at the MfN and in collaboration with the JAXA and NASA curation facilities. Current curators, together with the younger generation are being trained and working on skillset exchange