

# A New Laboratory Facility in the Era of Sample Return: the Sample Analysis Laboratory (SAL) at DLR Berlin

E. Bonato<sup>1</sup>, S. Schwinger<sup>2</sup>, A. Maturilli<sup>1</sup>, J. Helbert<sup>1</sup>

<sup>1</sup>Dept. of Planetary Laboratories, Institute of Planetary Research, DLR, Rutherfordstraße 2, 12489, Berlin, Germany

<sup>2</sup>Dept. of Planetary Physics, Institute of Planetary Research, DLR, Rutherfordstraße 2, 12489, Berlin, Germany

DLR is currently in the process of setting up a new Sample Analysis Laboratory (SAL) – a facility dedicated to the work on rock and dust samples returned from planetary bodies such as asteroids and the Moon. The key question driving the development of SAL is a more in depth understanding of the formation and evolution of planetary bodies.

SAL extends the currently available laboratory facilities at the Institute of Planetary Research at DLR in Berlin, including the Planetary Spectroscopy Laboratory (PSL), the Raman Mineralogy and Biodetection Laboratory (RMBL). SAL is focused primarily on *in situ* mineralogical and geochemical analysis mainly of extra-terrestrial material returned from sample return missions, as well as of meteorites and sample analogue materials.

Housed within ISO5 clean rooms, SAL will be equipped with glove boxes for handling and preparation of the samples. All samples will be stored under dry nitrogen and can be transported between the instruments in dry nitrogen filled containers.

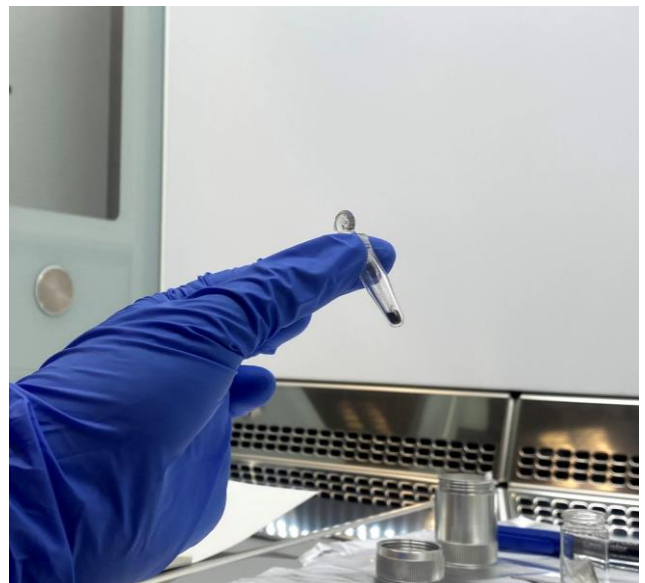
The instrumentation in the first step of the SAL set up consists of:

- Field Emission Gun Electron Microprobe Analyser (FEG-EMPA)
- Field Emission Gun Scanning Electron Microscope (FEG-SEM)
- X-ray Diffraction (XRD):
  - high resolution qualitative and quantitative analyses of powders
  - $\mu$ -XRD for *in situ* analysis and mapping
  - Non-ambient stage for dynamic experiments
- Vis-IR-microscope
- Polarized light microscope with automated stage
- supporting equipment for sample preparation and handling within a controlled atmospheric environment.

SAL is currently being set up. Construction work for the laboratories has started and the first instruments will be arriving by summer 2022. SAL will be operational by the end of 2022, on time to welcome samples collected by the Hayabusa2 mission. In collaboration with the Natural History Museum in Berlin 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 (Figure 1) collected from the Luna 24 Soviet mission and the first analyses of the material are being planned.

SAL follows the approach of a distributed European sample analysis and curation facility as discussed in the preliminary recommendation of EuroCares. Together with other laboratory facilities at the DLR Institute of Planetary Research (such PSL and RMBL) which are part of the Europlanet RI, the new SAL will be from the start open to the scientific community.

Our goal is to establish an excellence center for sample analysis in Berlin within the next 5-10 years building on our collaborations with the Natural History Museum and the Helmholtz Center Berlin in Berlin as well as the universities in Berlin.



**Figure 1.** Glass vial containing Lunar regolith collected during the Luna 24 mission.