

The NASA OSIRIS-REx Sample Catalog: Samples Returned from Investigators

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Introduction: OSIRIS-REx is a sample return mission that collected carbon-rich material from B-type asteroid Bennu [1]. After landing on September 24th, 2023, the science canister was transported to NASA Johnson Space Center (JSC) in Houston, Texas where it was opened and samples were processed by the curation team in pristine sample nitrogen gloveboxes [1]. As the sample analysis phase of the OSIRIS-REx mission concludes, the Sample Analysis Team (SAT) has returned the majority of mission samples to NASA JSC curation and will return the remaining samples on a defined timetable. The curation team processed and documented as many of these samples as possible to include in the spring 2026 catalog update and are steadily working to process hundreds of more samples to include in the fall 2026 catalog update.

Return Samples (Spring 2026): As of the spring 2026 catalog update, there are over 200 non-pristine samples returned from the Sample Analysis Team available for request. This includes particles, aggregates, polished thick sections, SEM stubs, FIB sections, TEM grids, embedded bullets and contact pads. When a Bennu sample is returned to JSC, it is transferred to a return sample handling laboratory where it is stored in a nitrogen-purged desiccator dedicated to non-pristine samples. OSIRIS-REx return samples are categorized as being either air-exposed, air-limited or air-free. This information is communicated to the curation team by the SAT member or principal investigator that returned the sample. Different sample processing protocols are followed for each category. Air-exposed samples are processed and documented in a return sample handling laboratory under ambient air conditions and then stored in a nitrogen-purged desiccator. A digital microscope is used to examine and image the sample. The current state of the sample along with the ability to be reallocated is noted by the processing team. Air-limited samples are samples that have been reported to have very little air exposure during analysis (e.g., sample quick exchanges and/or short periods of preparation) but otherwise have been stored exclusively under anoxic conditions (e.g., nitrogen, argon, vacuum). The processing team examines and images the sample under a digital microscope in a return sample handling laboratory under ambient air conditions. The sample is then taken to a non-pristine glovebox where it is sealed in an airtight container and then transferred to a nitrogen-purged desiccator for long-term storage. Air-free samples are samples that have been reported to have had no air exposure during analysis and are kept in an anoxic environment. The processing team examines and documents the sample in a non-pristine glovebox. A handheld camera is used to image the sample through the glovebox glass. It is then sealed in an airtight container and transferred to a nitrogen-purged desiccator for long-term storage.

It is highly encouraged to request OSIRIS-REx non-pristine return samples for scientific research. Our catalog contains a great variety of samples to choose from with particles and aggregates ranging in size, weight and color. Return sample availability for request will continue to increase as the curation team proceeds to process and document return samples from the Sample Analysis Team and eventually from the broader community.

References:

[1] Lauretta D.S. et al. 2024. Asteroid (101955) Bennu in the laboratory: Properties of the sample collected by OSIRIS-REx Meteoritics & Planetary Science 59 (9): 2453-2486