Training NASA , CSA and JAXA Astronauts
Image Courtesy: David Kring

USRA Universities Space Research Association

LUNAR AND PLANETARY SCIENCE

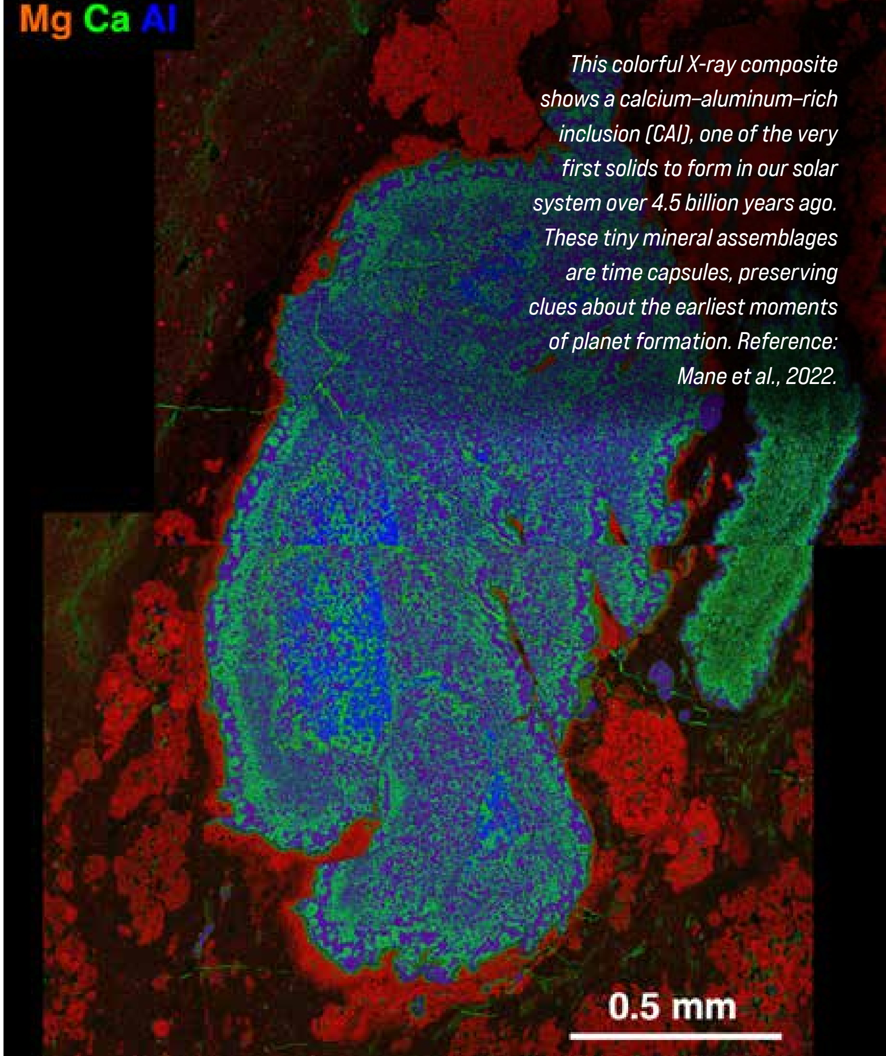
Expanding NASA's Community of Planetary Sample Scientists

As NASA undertakes increasingly challenging missions to expand human exploration of the Moon and lay the groundwork for future crewed missions to Mars, a skilled community of planetary sample scientists is essential to analyze the samples these missions will return. The Lunar and Planetary Institute brings together leading scientists, laboratories, universities, and industry partners to support NASA's growing sample science program. At its core, LPI is expanding the community of planetary sample scientists who will study materials returned from the Moon, Mars, asteroids, and other destinations across the solar system. Through hands-on training, virtual sessions, and topical symposia, LPI builds the expertise needed to investigate these rare samples, enabling discoveries that advance our understanding of the solar system and guide future exploration.

A participant (left) practices micromanipulation techniques during the Small Sample Handling Workshop led by LPI in partnership with Arizona State University. Under a stereo microscope, a glass needle is used to move 5 to 20 µm-sized particles of the Murchison meteorite. Another participant examines the sharp edge of a glass knife (right) used to cut ultrathin slices of samples for electron and light microscope applications. Images Courtesy: Lunar and Planetary Institute.

Studying Samples from the Early Solar System

NASA's OSIRIS-REx mission returned 120 grams of material from the asteroid Bennu, and JAXA's Hayabusa2 mission previously recovered 5.4 grams of similar material from the asteroid Ryugu. These pristine samples preserve evidence of conditions during the earliest stages of geological activity in our solar system. Scientists at the Lunar and Planetary Institute are leading studies of planetary materials by analyzing their chemistry, mineralogy, and isotopic signatures to uncover clues about how and when planets formed, how water and organic matter were delivered to Earth, and what processes shaped small bodies like asteroids and comets. This knowledge not only deepens our understanding of our own cosmic history but also guides the search for life on other worlds and informs future space exploration.



This colorful X-ray composite shows a calcium–aluminum–rich inclusion (CAI), one of the very first solids to form in our solar system over 4.5 billion years ago. These tiny mineral assemblages are time capsules, preserving clues about the earliest moments of planet formation. Reference: Mane et al., 2022.

This image shows a controlled-atmosphere silicate evaporation experiment. An induction furnace heats a graphite crucible inside a quartz cell to temperatures above 2000 °C. The experiment provides critical insight into silicate rock vaporization, helping explain the long-term evolution of lunar regolith and impact bombardment of the Moon. Image Courtesy: Lunar and Planetary Institute

Apollo 17 EVA-1 at Station 1 in the Taurus–Littrow Valley, taken on the northwestern flank of Steno Crater (about 150 m from the rim crest). The astronaut in the frame is Eugene "Gene" Cernan, seen at the rear of the Lunar Roving Vehicle next to seismic charge 6. The Apollo 17 crew collected 741 individual rock and soil samples totaling 110.5 kilograms. Image Courtesy: NASA.

What the Moon Reveals About Earth's Water

Today's researchers study Apollo samples collected more than 50 years ago, using advanced techniques to investigate the Moon's history and the processes that shaped Earth. A study led by the Lunar and Planetary Institute uses precise oxygen-isotope "fingerprints" to read the Moon's long-term impact record, revealing that only small amounts of water-rich meteorites struck the Earth-Moon system over the past four billion years. Even when scaled up for Earth's higher impact rate, the total delivered water would be only a small percentage of Earth's oceans. The Moon's preserved surface shows that late meteorite delivery cannot account for Earth's vast water supply, underscoring the importance of collecting and studying lunar samples to answer fundamental questions about our planet and our solar system.