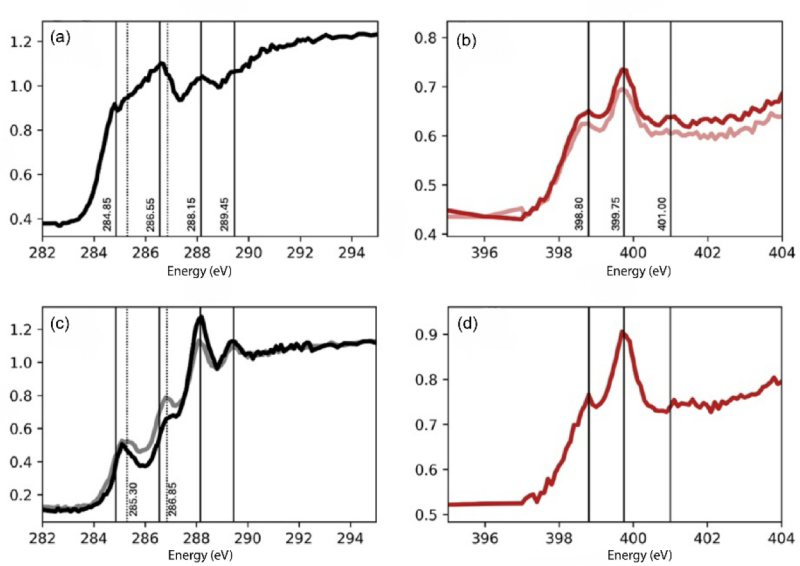
Ancient Asteroid Provides Evidence of Amino Acid Precursors



(a,c) X-ray spectra showing the chemical bonds of carbon atoms (black lines) in two particles.
(b,d) X-ray spectra of nitrogen atoms (red lines) of the same particles as (a,c).
The gray and pink lines show how chemistry changes as the sample is irradiated by x-rays providing hints into the types of bonds present.

Scientific Achievement

Researchers have identified nitrogen-rich polymers in samples from the asteroid Bennu, revealing early chemical alterations in rocky bodies.

Significance and Impact

The results support the idea that asteroids, such as Bennu, may have carried water and the other chemical building blocks of life to Earth in the distant past.

Research Details

- At the Advanced Light Source, researchers used scanning transmission x-ray microscopy and infrared nanospectroscopy to determine the type and location of chemical bonds with sub-micron spatial resolution.
- The data complemented transmission electron microscopy performed at the Molecular Foundry, which helped determine the crystalline structure of the contents.

S.A. Sandford, Z. Gainsforth, M. Nuevo, M.A. Marcus, H. A. Bechtel et al., *Nature Astronomy* **9**, 12 (2025), doi:10.1038/s41550-025-02694-5

Work was performed at ALS/Molecular Foundry.