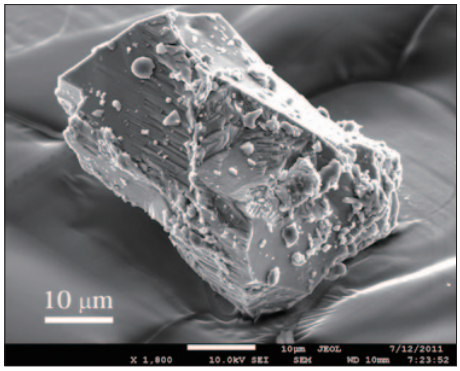
Research Highlights

Evolving planets get a bumpy ride



Scanning electron microscope image of a particle from the Itokawa asteroid brought to Earth by Japan's Hayabusa space probe (Copyright Eizo Nakamura 2012).

Asteroids are considered to comprise intermediate products in the evolution of solar bodies. The Japan Aerospace Exploration Agency (JAXA) sent a probe to investigate the near-Earth asteroid 25143 Itokawa with the aim of learning more about the evolution of the solar system. Eizo Nakamura and colleagues at Okayama University and the Japan Aerospace Exploration Agency (JAXA) have now studied samples retrieved by the probe — the first reported analysis of grains taken directly from a solar body in space.

Using scanning electron microscopy, the researchers identified craters 100-200 nm in size as well as particles adhered to the asteroid surface. They suggest that a combination of disaggregation, cratering, melting, adhesion, agglutination, and implantation/sputtering affect the asteroid surface as a result of bombardment by submicrometre sized particles in space.

Among the other features observed in the grains a type of feldspar occurrence would have formed during slow cooling from temperatures of 860 °C. These temperatures and cooling dynamics could not have been achieved in a rock with a radius of only 300m. As a result it is likely that the asteroid Itokawa originated from a larger asteroid.

"We suggest that the chemistry and textures of Itokawa's surface reflect long-term bombardment of equilibrated chondritic material, at scales of 10–9 to 104 meters," conclude the authors. They add that impact processes in general play a central role in the evolution of planetary bodies.

Reference:

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