Abstract

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Mechanical and electrostatic experiments with dust particles collected in the inner coma of comet 67P by COSIMA onboard Rosetta

The *in situ* cometary dust particle instrument COSIMA (COmetary Secondary Ion Mass Analyser) onboard ESA's Rosetta mission has collected about 31 000 dust particles in the inner coma of comet 67P/Churyumov–Gerasimenko since August 2014. The particles are identified by optical microscope imaging and analysed by time-of-flight secondary ion mass spectrometry. After dust particle collection by low speed impact on metal targets, the collected particle morphology points towards four families of cometary dust particles. COSIMA is an *in situ* laboratory that operates remotely controlled next to the comet nucleus.

The particles can be further manipulated within the instrument by mechanical and electrostatic means after their collection by impact. The particles are stored above 0°C in the instrument and the experiments are carried out on the refractory, ice-free matter of the captured cometary dust particles. An interesting particle morphology class, the compact particles, is not fragmented on impact. One of these particles was mechanically pressed and thereby crushed into large fragments. The particles are good electrical insulators and transform into rubble pile agglomerates by the application of an energetic indium ion beam during the secondary ion mass spectrometry analysis.