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Laboratory experiments simulating for sample recovery in the Hayabusa-2 mission.

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Sample return mission from C-type asteroid 162173 1999JU3 is planned as the Hayabusa-2 mission. The sampling method is 'impact sampling', which was adopted in the Hayabusa mission. We have performed impact experiments using simulants of a carbonaceous chondrite, which may corresponds to the surface material of the target asteroid, to increase the amount of samples by improving the impact conditions.

We carried out laboratory experiments using a gunpowder gun, which will be used in the Hayabusa-2 mission. The projectiles were hemisphere shaped tantalum (d=10mm,4.6g) and impact velocity was about 200 m/s. The simulants, which was used as targets in the experiment, were synthesized by sintering a mixture of soda lime glass beads of 250-355 microns (simulating chondrules) and <20 microns (simulating matrix). The mixing ratio of these glass beads was 20 or 50 volume %. The tensile strength of carbonaceous chondrites is in the range from about 0.1 to 10 MPa (Tsuchiyama et al., 2009.) By controlling the sintering temperature and duration, simulants with such strengths were obtained. We also used firebricks and glass beads as the targets.

Different mass distribution of fragments, ejection velocity of fragments and size of the crater were obtained for simulants with different strengths.

Keywords: Hayabusa-2, sampling, impact