

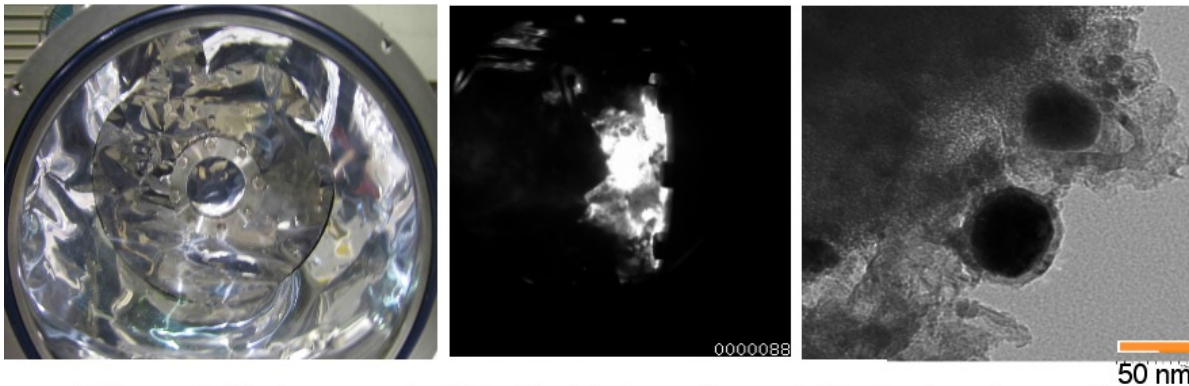
Impact production of carbon clusters in nitrogen gas by use of a gas gun

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We are interested in the production processes of carbonaceous materials in space. Especially, asteroids coming to Titan satellite have made impact production of carbonaceous particles, for which we are doing simulation experiment. On the Titan surface, various material, produced by the impact reactions, has been stored under low temperature and dark condition. To do the simulation experiment, JAXA 2-stage light-gas-gun is used. A projectile with 6.5 km/s of speed hits a target in 1 atm of nitrogen gas, by which carbon clusters are produced in gas atmosphere. Figure (a) shows the target (75 mm in diam. in the pressured chamber). Figure (b) shows the profile of the plume on the target. Produced clusters are analyzed using a TEM, TOF-MS, FT-IR etc. As a result, production of fullerenes, carbon capsules (Fig. (c)), balloon-like carbons, nanotubes and carbon molecules with nitrogen atoms has been confirmed. As a target, aluminum, iron, iron + ice, iron + hexane etc are used, which are sometimes cooled down less than -70 degree C. We are considering the reaction process in this impact reactions including the scale factors.

Keywords: impact reaction on stars, Titan, carbon cluster, carbon capsule, nitrogen gas, gas phase reaction



(a) A target inside the pressured chamber.

(b) Profile of the impact image on the target.

(c) Produced metal encapsulated carbon particles measured by TEM.