Collisional destruction of iron meteorites

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M-type asteroids were classified as fraction of metallic core of plaetary bodies
. Many of them are however, thought to be rocky yet,rader albedo indicates that some of them are likely to be metal bodies. Thus,it needs to study about collisional process of the parent body of iron meteorites. Previous collisional experiments of iron meteorites were not many and not enough to figure out the collisional evoluton of the parent bodies of iron meteorites. Therefore,in this study, we performed collisional experiments using iron and iron meteorites with new conditions, and examined the largest fragment mass fraction of the iron and iron meteorites after impact.

We used a two-stage light-gas gun in Institute of Space and Astronautical Sciente(ISAS). Projectiles were discs of diameter 4mm and height 1mm cut from Mundrabilla iron meteorite,and targets were serpentinite cubes of 5cm and 8cm. The projectile velocities were about 3km/s. After impact we collected the fragments of the projectiles and examined their shape.

We examined the relation between impact energy density and mass fraction of the largest fragment, and compared them to a previous study in which iron projectiles were used. There is no difference between iron and iron meteorites. We then estimated the initial peak pressure and the amount of work at impact using of Hugoniot equation. We estimated the temperature of the iron and iron meteorite at impact,and found it is below the melting point. Therefore,the deformation of the iron and iron meteorites were from their ductile behaviors. There is no correlation between the peak pressure and the degree of deformation. We plan to perform similar experiments using iron projectiles and we will present and discuss about the large deformation of iron objects at impact in more detail.