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Observation of the mass and velocity of projectile fragments produced by hypervelocity impact with light-weight ceramic targets FUMIKAZU SAITO, National Defense Academy, NOBUAKI KAWAI, Japan Aerospace Exploration Agency, HIDEKI TAMURA, National Defense Academy — In order to characterize dynamic fracture of Al projectiles caused by impact with light-weight ceramic targets, we performed hypervelocity impact experiments of light-weight ceramic targets using spherical Al projectile accelerated by mini twostage light-gun. As ceramic targets, Mullite, Silicon nitride, and Alumina ceramics with 1 mm thick are chosen. Aluminum-alloy projectiles of 2.1 mm in diameter are accelerated up to 4.8 km/s and impacted onto the targets under normal impact condition. The dynamic fracture of targets and projectiles is observed with flash, soft x-ray radiography and high speed digital framing camera photography, and we propose a new method for calculating the mass of impact fragments by means of flash x-ray and x-ray imaging plate. A witness plate is used to evaluate a protective performance of the targets. In comparison to the results of Silicon nitride and Alumina targets, Mullite target breaks up the projectile into smaller fragments than the other targets, and the scattering angle of the debris generate from Mullite target is larger than that of the other targets. These results suggest that Mullite ceramics will be promising structural member making up debris shield.

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