

The Experimental Estimation of the Collisional Velocities between Two Chondrules in the Solar Nebula

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In order to understand the formation mechanism of chondrules, previous studies have investigated the maximum temperature and heating duration as well as the cooling rate, that chondrules had experienced. Chondrules must have had relative velocities to each other, but their magnitude is only speculative up until now. The present experiment has devised a method that a chondrule-like molten droplet collides with a solid target in vacuum, as an analogue of the compound chondrule formation. We have controlled the relative velocities as well as the temperatures of both objects during impact, and measured deformation of the projectile droplet. By comparing the experimental results with natural compound chondrules we are able to deduce the relative velocities of chondrules in the nebula.