POROSITY CHANGE IN PARENT BODIES DUE TO IMPACT. A. M. Nakamura Graduate School of Science, Kobe Univerisyt, amnakamu@kobe-u.ac.jp.

Introduction: Observations of asteroids show they have a range of porosity, with typical value of 20-40 % [1]. The internal structure of asteroids has been evolved through collision processes. Therefore, it is of importance to investigate in detail the porosity change in impact processes. The purpose of this study is to compile the results of laboratory impact experiments from the view of porosity evolution of meteorite parent bodies.

Porosity Increase: Mutual collisions in the asteroid main belt occur with relative velocity of several km/s. Such a collision results in between catastrophic disruption of the colliding bodies and cratering of the surface of the larger body. Part of the ejecta from the catastrophic disruption or the cratering subsequently re-accumulates each other or onto the surface. The re-accumulation of ejecta into rubble-pile brings or increases macro porosity. For example, the porosity of asteroid 25143 Itokawa is considered to be about 40% and be due to re-accumulation process [2]. The high-velocity collisions also increase the internal porosity of parent bodies by creating and growing cracks and flaws [3], although by only a few percent in basalt impact experiments.

Porosity decrease: Cratering impact onto the surface of porous bodies compresses the material under the impact point and thus decreases the porosity [4]. Low-velocity laboratory collision experiments of porous gypsum spheres show that compaction occur at collision velocity of about 10 m/s. The decrease of the porosity was found to be about 15 % [5]. The re-accumulation velocity should be less than the escape velocity and of the order of m/s - tens m/s for asteroids of tens km in diameter. Therefore, such compaction and decrease of porosity at low-velocity collision may play a role as well as the ones by high-velocity collision at velocities of km/s.

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