

CHONDRULES AND EXSOCHONDRULES FORMED IN OPEN PROCESS OF THE SOLAR SYSTEM.

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Introduction: Solids formed in the Solar System are originated at nuclear explosions of the Solar Star at super-extreme conditions spread out rapidly in cooler space through many collisions. The present paper is discussed on formations of chondrules and exsochondrules by difference with dynamic cooling process as the main purpose here, which can be developed to be observed its probable locations of two different collision debris by the space-telescope.

Classification of solids by cooling process: Rock textures formed by various processes are largely classified by two open and closed systems in and out of active planet Earth as follows:

1) Open system: Extraterrestrial space in the solar system shows open system with non-circulated process of three states for vapor-liquid-solid (called as VLS in this paper) materials, which is caused as formations of chondrules and exsochondrules from different compositions, locations and cooling rates.

2) Closed system: Terrestrial location in the solar system reveals closed system with circulated process of three states for vapor-liquid-solid (called as VLS in this paper) materials, which is caused as formations of "Earth-type rock textures (coarse- and fine-grained, porphyritic and glassy) " from the same magmatic melting locations.

Two open and closed system can be also expressed even in collision process locally of dynamic and shocked pressure and temperature (called as P and T in this paper) changes of the Solar System formation as open system with less circulated, quenched to tiny solids, and closed system with circulated to larger solids finally (cf. Fig.1) [1, 2].

Chondrules and exsochondrules: Chondrule with micrometer to centimeter in size is formed relatively by slower cooling from vapor, fluid to solid (VLS) process of larger growth debris passed through medium P,T conditions within the shocked extreme plume area (center with longer condition) . Pebble-sized objects with centimeter to meter in size are based on slower process on bulk- melting among the VLS states of collision-based process, where the size limits are caused by rapid shocked quenching (in open system) relatively than water-Earth planet of global three VLS recycle system with closed global system as shown in Figure 1 [1, 2].

Exsochondrule with micrometer to centimeter might be formed from vapor quenching without major melting to solidified debris by relatively high T (with

low P) and/or high P (with low T), which are discontinuous conditions of edge boundary location during major collision-formed plume space (Figure 1) [1, 2].

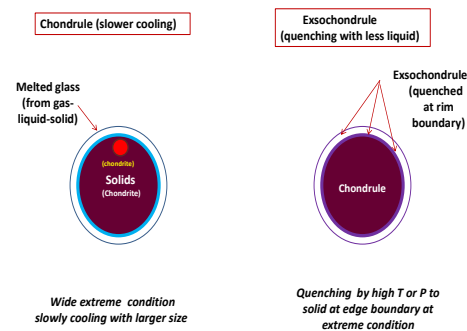


Figure 1. Schematic diagram of formation on closed-open systems with slower- quenched processes, relatively, in collision processes.

Application for telescopic investigation: The present model indicates explosion shocks by collision with hot vapor plume and colder edge, which are main extreme condition in the extraterrestrial space.

Cosmochemical and spectral signatures of chondrules and exochondrules are not direct way, but cooling process during larger or multiple collisions at explosive plume area as major investigated locations.

Summary: The present study can be summarized as follows.

1) Collision process can be expressed locally by open and closed system in extraterrestrial space.

2) Chondrule is formed slowly cooled by from vapor, fluid to larger solid process.

3) Exsochondrule is formed by vapor quenching with lessmelting to tiny solids finally.

4) Cosmochemical and spectral signatures of chondrules and exochondrules are observed at cooling process during larger or multiple collision at explosive plume area.

References: [1] Miura Y. (2017): *LPSC2017 (USRA, LPI, USA)*, abstract #3028. [2] Miura Y. (2017): *JpGU-AGU 2017 (Makuhari, Japan)*, abstract submitted (in press).