DIFFERENT DENSITIES OF DIAPLECTIC PLAGIOCLASE CRYSTALS AMONG METEORITES, LUNAR ROCKS AND TERRESTRIAL IMPACT CRATERS; Y. Miúra and T. Kato. Faculty of Science, Yamaguchi University, Yamaguchi,753, Japan.

Among different impact-related diaplectic feldspar glass (i.e. maskelynite) and diaplectic plagioclase crystal[1-10], the physical properties (esp. density) are discussed in the latter materials (i.e. the diaplectic feldspar crystals) to evaluate the formation processes by the "diaplectic degree" obtained by the calculated density from the unit-cell volume and compositions from the electron microprobe (EPMA) data of single crystals among the meteorites, the terrestrial impact craters and the lunar rocks. As the compositional changes of the lunar and terrestrial plagioclases are discusssed in other paper [10,11], the main subject of the paper is structural (esp. density) changes of various planetary plagioclases .

Terrestrial impact craters. The samples used in this study are 16 outcrop rocks from the Manicouagan Crater, Canada (10 anorthosites and 2 gneisses in the central peak, and 4 melt rocks) [5]. The samples with the lowest density (i.e. -3.8%) are found at the top of the central peak, though the lower density (i.e. -0.1~-0.4%) diaplectic plagioclases (compared with those formed by the terrestrial igneous activity) are found in the crater rim [7-9], as shown in Fig. 1. The lower region of the central uplift shows various density-variation (i.e.+0.3~-3.2%) for the diaplectic plagioclases (cf. Fig. 1). The detailed study of the density-variation in the Manicouagan Impact Crater will be used as strong indicator of the possible impact craters in the world (esp. in the craters with less igneous contamination). The lattice images of the diaplectic plagioclase, together with the structure and composition, indicates that the lower-density is caused by disorder of the structure within the constituent atoms. The other samples from the Sudbury breccias and the drilled cores (with igneous contamination), however, show slightly higher-density (i.e. +0.2%).

Meteorites. The plagioclase crystals from the Juvinas, Stannern and Camel-Donga eucrites show the higher values of density (i.e. +0.1~1.0%) which are completely different with those of the diaplectic plagioclase crystals from the Manicouagan Impact Crater. The result indicates that the higher-density of eucritic plagioclases is caused by the mixing of foreign elements (such as Fe and Mg etc.) which is assumed to occur not by direct impact process but probably by igneous (-like) activity.

Lunar rocks. Preliminary examinations of the various lunar samples indicate that the lunar samples are similar to lower-density diaplectic plagioclase crystals (esp. in 70017,124 and 68501,169). The detailed study by the single crystals will elucidate the density-variation of the impact-related plagioclases in the lunar surface materials.

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Experimental approaches by railgun. The preliminary impact experiments by the railgun accelerators at the ISAS, Japan [12] indicate that diaplectic plagioclase crystals at the artificial crater occur with various diaplectic degrees.

Summary. It is found in this study that the difference in the density of the diaplectic plagioclase crystals is due to the different formation processes, as shown in Table 1. The lowest density is found in large impact events without igneous contamination (as in the Manicouagan Crater and probably in the lunar rocks). Higher-density is observed in the samples formed by major igneous formation (as in the eucrites separated from the parent body and the Sudbury Crater filled by the later igneous activity).

The research is in part supported by the Grant-in-Aid for Scientific Research on Priority Areas (Origin of the Solar System) of the Japanese Ministry of Ed., Science and Culture(6311005) of the senior author. We thanks Drs. A. Naldrett and R. Grieve for sample investigations and comments of the Sudbury and Manicouagan Impact Craters.

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Table 1. Summary of the density-variation of diaplectic plagioclase crystals from terrestrial and extraterrestrial materials.

Sample	Higher-density	Lower-density
Manicouagan Crater	Minor(+0.3%)	Various; Major(in the Central peak,~-3.8%)
Lunar samples	-	Various(~-3.6%)
Sudbury Crater	Major(~+0.2%)	-
Eucrites	Major(~+1.0%)	-

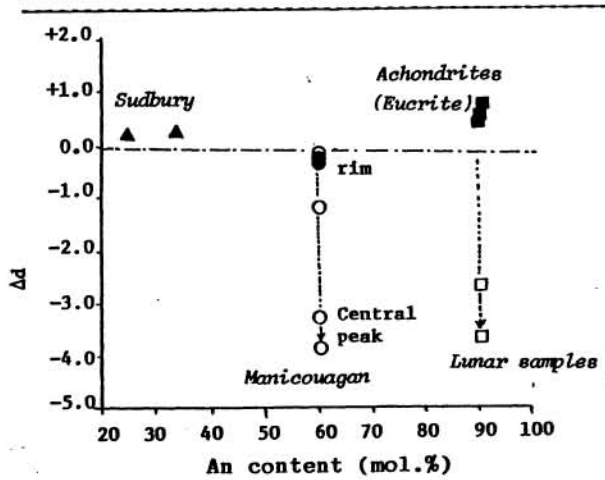

Fig. 1. Relation between An content and density-change referred to that of terrestrial igeous plagioclases in terrestrial impact craters, the eucritic achondrites, and the lunar rocks.

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