

Thermoluminescence and cathodoluminescence studies of shocked ordinary chondrites

Yasuyuki Ishida[1]; Kiyotaka Ninagawa[2]; Hirotsugu Nishido[3]

[1] Applied Physics, Okayama Univ. of Science; [2] Applied Phys. Okayama Univ. of Science; [3] Res. Inst. Nat. Sci., Okayama Univ. Sci.

Collision is a fundamental process, which has taken place in the solar system, making craters, regolith and breccia in planetary surface and meteorites. Plagioclase is one of main minerals as well as olivine and pyroxene in ordinary chondrites. Shock accompanied with the collision makes deformations on plagioclase. The plagioclase is also a thermoluminescent mineral in ordinary chondrites. The thermoluminescence (TL) is a useful tool to detect difference of solid states, namely defects in the plagioclase, which cannot be clarified by optical observation and compositional analysis of minerals.

It is known that equilibrated ordinary chondrites have a peak of 450 nm at low temperature and 400 nm at high temperature near 350 oC. However we have found an additional 570 nm peak at high temperature in Y-75097 group; Y-75097 (L6), Y-75108 (L6), Y-75102 (L6) and Y-74190 (L6). This group includes maskeynite. This fact implies that the change of TL peak at high temperature may be produced by strong shock effect.

Two dimensional TL images at 400 and 600 nm for Y-75097 group and Dar al Gani 528 (L6, S6) were measured. Glow curves analysis of Y-75097 group shows that plagioclase is also responsible for yellow TL at high temperature. There are two regions, blue and yellow CL region in Dar al Gani 528. Plagioclase in yellow CL region shows TL at high temperature.

Usual TL measurements using a photomultiplier with a 600 nm bandpass filter were also applied to Y-75097 group and Dar al Gani 528. In their glow curves, Y-75097 group shows higher TL intensity than Dar al Gani 528. Y-75097 group seems to be an unique equilibrated chondrites.