

THERMOLUMINESCENCE STUDY IN THE JAPANESE ANTARCTIC METEORITES COLLECTION: YAMATO 98 UNEQUILIBRATED ORDINARY CHONDRITES II

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Introduction: Induced TL (thermoluminescence), the response of a luminescent phosphor to a laboratory dose of radiation, reflects the mineralogy and structure of the phosphor, and provides valuable information on the metamorphic and thermal history of meteorites. Especially the sensitivity of the induced TL is used to determine petrologic subtype of unequilibrated ordinary chondrites [1]. Natural TL, the luminescence of a sample that has received no irradiation in the laboratory, reflects the thermal history of the meteorite in space and on Earth. Natural TL data thus provide insights into such topics as the orbits of meteoroids, the effects of shock heating, and the terrestrial history of meteorites [2]. Natural TL properties are usually applied to find paired fragments [3-7].

We measured induced and natural TL properties of forty-two Yamato 98 unequilibrated ordinary chondrites (LL3: 9, L3: 14, H3: 19) from Japanese Antarctic meteorite collection. Sampling positions of these chondrites were measured by GPS.

Primitive ordinary chondrites: Most of the chondrites had TL sensitivities over 0.1 (Dhajala=1), corresponding to petrologic subtype 3.5-3.9. Three chondrite, Y983183 (LL3.0), Y983278 (LL3.3-3.4), Y980324 (LL3.2-3.4) were revealed to be a primitive ordinary chondrites below petrologic subtype 3.4. They are particularly significant in understanding the nature of primitive material in the solar system.

Pairing: Natural and induced TL properties were also applied to find paired fragments, and we found 24 TL potential paired fragments, satisfying TL pairing criteria [3]. A group of H3 comprises a chain of 7 potentially paired fragments, Y980052, Y980053, Y980054, Y980072, Y980074, Y980075, and Y980078. They were sampled at the same position, 35.336°E 72.152°S. They all could be paired. Sampling positions of another potentially paired fragments, Y980143 and Y980129, were close to each other. They also could be paired. However three groups of potentially paired fragments were away over 40 km from each other. Then they were not pair.

Acknowledgements: This work was carried out in part under the Visiting Researcher's Program of the Research Reactor Institute, Kyoto University.

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