

Attempt to measure magnetization of single pollen in microgravity condition

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Precise analyses performed on microfossil pollen included in the soil have provided quantitative information to reconstruct the paleoclimate. In order to improve the precision of the chronological data, it is necessary to reduce the lower limit of detectable number of pollen included in the sample per unit volume. In analyzing an aggregate sample composed of heterogeneous grains, it is often difficult to conclude by visual observations whether or not the minor grains included in the sample are completely discovered and identified without omission. In such cases, it is desirable to separate the aggregate into single grains and identify their material prior to various scientific researches. It was proposed that identification of solid grain is possible by comparing the grain's magnetization obtained by field-induced translation, with the compiled data of magnetization [1]. The proposed principle of identification has significance in investigating rare samples, such as primitive meteorites, because the method can analyze the small grains in a simple manner without consuming them.

In order to quantitatively evaluate the practicability of separating the microfossil pollen from the soil mineral grains, it is necessary to the precise value of magnetic susceptibility of pollens. Therefore, M-H curves were measured for two kinds of pollen, namely plum and hinokia cypress using a vibrating sample magnetometer VSM. The measurements were performed by sweeping static field between -0.5 and 0.5 T at room temperature. In addition to the diamagnetic relationship expected for the organic chemical composition of pollen, features that indicate saturated moments M_s were observed in the M-H curves of plum pollen, while no evidence of M_s was observed for hinokia cypress. The M_s values showed linear correlations with sample mass m for the two samples. The above-mentioned results magnetization results chemical analysis.

[1] K. Hisayoshi & C. Uyeda, J. Jpn. Soc. Microgravity Appl., (2012).

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