IN-SITU U-Pb DATING OF PHOSPHATES IN LUNAR BASALTIC BRECCIA ELEPHANT MORAINE 87521

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Introduction: The lunar meteorites have been valuable sources for understanding the origin and evolution of the Moon, as they could potentially provide a new insight into the thermal history of unexplored regions of the Moon. For example, the predominance of low-Ti and Very-Low-Ti (VLT) basaltic materials in the lunar meteorites contrasts with the scarcity of VLT basalts among lunar samples returned by the six Apollo and three LUNA missions [1-2]. In spite of their scientific interests, chronological studies of brecciated lunar meteorites have proved to be difficult, since they are mixtures of materials with different origins. In this paper, we report the in-situ U-Pb dating of phosphates in the brecciated lunar meteorite Elephant Moraine 87521 (hereafter abbreviated as EET 87521), which are classified into VLT basalt [3-6], and then compare with those of EET 96008 which are considered to be paired, using the Sensitive High Resolution Ion MicroProbe (SHRIMP) installed at Hiroshima University, JAPAN [7-9].

Results and Discussion: Three analyses of whitlockite and five analyses of apatites indicate a total Pb/U isochron age of 3531 ± 110 Ma (95% confidence limit), consistent with those of EET 96008 (3569 ± 100 Ma [10]) and slightly older the K-Ar gas retention age in the range 3.0-3.4 Ga based on the bulk analysis [11,12]. This age discrepancy may be due to radiogenic ^{40}Ar loss related to the shock event.

It is noted that these phosphate ages are quite distinct from previous chronological studies on VLT mare basalt of 3.2-3.3Ga for LUNA 24 [13], extending the VLT magmatism 0.2 Ga prior to the known. Taking into account of the recent radiometric ages of VLT lunar meteorite “Northwest Africa 773”(2.91 Ga [14,15]), the VLT basalt activity appears to have been continuous and/or intermittent during the time span of 6~7x10^8 years.

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