ALUMINIUM-MG SYSTEMATICS OF WINONAITES AND DIFFERENTIATION OF THE IAB-WINONAITE PARENT BODY.

Y. Hidaka[1], V. Debaille[1] and G. Hublet[1]. [1]Laboratoire G-Time, Université Libre de Bruxelles, Brussels, Belgium.

Introduction: Primitive achondrites such as winonaites are important materials to investigate the early differentiation processes of asteroids. Winonaites are considered to originate from the same parent body than IAB non-magmatic iron meteorites [1]. Short-lived radionuclide chronometers are useful to understand the first few million years of the solar system history. The Al-Mg system is one of the most established short-lived systematics that provides a very good time resolution.

Previous Hf-W isotopic studies have revealed that IAB-winonaite parent body had accreted ~1 Ma after CAI formation [2] and its magmatic activity ceased ~4 Ma later [3]. However, there is no other chronological data of winonaites from other short-lived radionuclide systems, in particular from fully lithophile systematics, as W is siderophile. Therefore, we consider here additional Al-Mg chronological data of winonaites to investigate the early evolutionary history of the silicate portion of their parent body.

Results and Discussion: We have investigated two winonaite meteorites NWA 725 and Y-8005, with a present focus on the first one. NWA 725 is officially classified as an acapulcoite, but oxygen isotopic data of this meteorite indicated that NWA 725 and paired meteorites are actually winonaites [4, 5]. NWA 725 has been reported as chondrule-bearing, the least metamorphosed primitive achondrite [6]. The evolutionary models of IAB-winonaite parent body [1, 2] indicated that this parent body should preserve intact, chondritic areas during partial melting and silicate-metal segregation processes. We performed mineral separation by using isodynamic magnetic separator (Frantz, L-1) and could obtain Mg isotopic data from 4 separated fractions and one bulk rock for NWA 725. The fractions measured up to now have $\delta^{26}Mg^*$ deficits, from -0.026±0.022 to -0.009±0.040, and subchondritic $^{27}Al/^{24}Mg$ ratios from 0.046 to 0.056. From these data, we obtained a preliminary age for NWA 725 of ~1.4 Ma after CAI formation, using parameters from [7]. However, due to small variation of Al/Mg ratios, the obtained age is associated to a large error. The remaining fractions, notably the plagioclase one, will improve the dating. This preliminary Al-Mg age is in the lower range of previous Hf-W ages (1.5 to 5 Ma) [3]. This could be related to the difference between the samples. NWA 725 is an unmelted winonaite while the meteorites analyzed in [3] suffered a certain degree of partial melting. This hypothesis is corroborated by the fact that the bulk $\delta^{26}Mg^*$ (-0.009±0.040) and the $^{27}Al/^{24}Mg$ (0.056±0.011) of NWA 725 are close to chondritic. The very old age of NWA 725 could possibly indicate the accretion age of IAB-winonaite parent body. On the other hand, the precision on our age for NWA 725 is still poor, and the data set will be increased to obtain more precise age information.

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