

^{182}Hf - ^{182}W SYSTEMATICS IN CR2 CHONDRITES

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Introduction: CR metal-rich chondrites are among the most pristine meteorites known in the solar system. They contain numerous presolar grains [1] and show no evidence for shock or thermal metamorphism [2]. These samples are well suited for studying the earliest stages of metal formation as they contain about 5-8 wt.% metallic Fe and Ni [3] and 1-4 wt.% metal sulfides. Metal is present as metal chondrules, rims around silicate chondrules, grains within chondrules, and small metal inclusions. Half of the metal is located around chondrules or within olivine crystals.

Samples and analytical procedure: The ^{182}Hf - ^{182}W isotope system is a tool of choice to decipher the metal-silicate differentiation history. Besides, Hf and W are rather insensitive to aqueous alteration so that the ^{182}Hf - ^{182}W chronometer should not have been disturbed even if many CR2 are hydrously altered. Three chondrites were selected for the present study: Renazzo, NWA801 and another CR2 (provisional name: NWA 721). After crushing, a bulk sample, a metal-rich fraction and 1 to 3 less- or non magnetic (i.e. silicate rich) fractions were prepared. The metal-rich phase was separated using a hand magnet. After digestion, W was separated and purified following the technique described earlier [4]. Tungsten isotope measurements were performed on a Nu 1700 MC-ICPMS taking advantage of the high sensitivity of this instrument, and concentration measurements on an Agilent ICPMS.

Results and Discussion: The $^{182}\text{W}/^{184}\text{W}$ ratios of the different mineral fractions of NWA 721 correlate with their Hf/W ratios defining an internal isochron. The slope of $(7.3\pm 1.4)\times 10^{-5}$ corresponds to an age of 4.9 ± 2.5 Ma after CAIs. An internal isochron is also obtained for Renazzo. The inferred age of 55.5 ± 2.5 Ma is compatible with the equilibrium age for CR2 chondrites inferred from Mn-Cr systematics [5] but disagrees with the early formation age of Renazzo chondrules proposed by [6]. Weisberg et al. [7] and Choi et al. [8] have shown that the O-isotopic composition correlates with the degree of alteration of CR chondrites. According to this trend, Renazzo is quite altered, while NWA721 is more pristine. NWA801 is even more pristine (^{16}O -rich), hence the interest of this sample while looking at the earliest stages of metal formation. The first Hf-W data obtained on this meteorite yield a very old formation age of 2.5 ± 1.0 Ma after CAIs. The metal of the NWA 801 chondrite is thus as old as some magmatic iron meteorites. Different processes of metal formation then co-existed at that time.

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