INVESTIGATING THE GENETIC RELATIONSHIP BETWEEN NWA 5492 AND GRO 95551 USING HIGH-PRECISION CHROMIUM ISOTOPES.

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Introduction: Northwest Africa (NWA) 5492 and Grosvenor Mountains (GRO) 95551 are two unique, metal-rich chondrite breccias that exhibit broad textural similarities to established metal-rich chondrite groups CH and CB [1,2]. While textural resemblances exist to CH and CB chondrites, both NWA 5492 and GRO 95551 exhibit chemical and isotopic characteristics (e.g., evidence for silicate formation in extremely reducing conditions, unique oxygen isotopic and metal chemical compositions) that indicate their formation from a source distinct from that of the CB and CH chondrites [1-3]. The similarities in the unique chemical composition of NWA 5492 and GRO 95551, as well as overlap in oxygen isotopic composition, have been used to infer a possible genetic relationship [1]. Here we report high precision Cr isotopic measurements (i.e., ε^{53}Cr and ε^{54}Cr) to further investigate the potential petrogenetic relationship between NWA 5492 and GRO 95551.

Analytical Methods: Chromium isotopic analyses were completed by dissolving aliquots of crushed, homogenized powders of both NWA 5492 and GRO 95551 (40.06 mg and 33.43 mg, respectively). The powders were dissolved in a 2:1 HF-HNO_3 solution in Parr bombs for 96 hours in a 190°C oven. Separation of Cr was completed using the 3-column procedure described by [4]. High-precision Cr isotopic ratios were measured using a Thermo *Triton Plus* thermal ionization mass spectrometer at the University of California at Davis (measurement details are the same as those described in [5]).

Discussion: The measured ε^{54}Cr isotopic composition (reported relative to terrestrial standard NIST SRM 979) of NWA 5492 and GRO 95551 are 0.09±0.07 and 0.00±0.11, respectively. The ε^{53}Cr for NWA 5492 and GRO 95551 are 0.02±0.04 and 0.06±0.04, respectively. The ε^{53}Cr and ε^{54}Cr value of GRO 95551 determined here are consistent with previously reported values by [6]. These ε^{54}Cr values are well resolved from the carbonaceous chondrites groups, but indistinguishable from previously measured EH and EL chondrites [7]. However, incorporating the Δ^{17}O composition, both NWA 5492 and GRO 95551 plot in a unique location in ε^{54}Cr-Δ^{17}O isotope space, well resolved from both carbonaceous and enstatite chondrites. This unique position in ε^{54}Cr-Δ^{17}O isotope space provides additional evidence to preclude a genetic link to the CH, CB, EL, and EH groups. The indistinguishable ε^{54}Cr values between NWA 5492 and GRO 95551, coupled with the similar Δ^{17}O compositions [2,3] further support a similar source reservoir for both NWA 5492 and GRO 95551 and their origin from a previously unsampled parent body.

References: [1] Weisberg M. K. et al. 2012. *MAPS* 47:363-373. [2] Weisberg M. K. et al. 2001. *MAPS* 36:401-418. [3] Friend P. et al. 2011.Abstract #1095. 42nd LPSC. [4] Yamakawa A. et al. 2009. *Anal. Chem.* 81:9787-9794. [5] Sanborn M. E. and Yin Q.-Z. 2015. Abstract #2241. 46th LPSC. [6] Qin L. et al. 2010. *GCA* 74:1122-1145. [7] Trinquier A. et al. 2007. *ApJ* 655:1179-1185.