**TRACE ELEMENT DISTRIBUTION IN MAIN GROUP PALLASITES**

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**Introduction:** The origin and evolution of pallasites is still unclear: proposed models include formation at the core-mantle boundary region of asteroids, as well as by impact [1], dendritic core growth [2] and crystallisation of material close to the surface of an asteroid subject to external heating [3]. Links between pallasites, IIIAB irons and HEDs based on oxygen isotope analysis [4] has been re-evaluated, since high resolution measurements revealed different oxygen isotope values for these groups [5]. Pallasites also have different cooling rates from IIIAB irons [6]. We are undertaking a trace element study of main group pallasites (PMG) to re-assess potential formation mechanisms.

**Analysis:** We characterized polished 1 inch blocks of Hambleton, Brahin, Seymchan, Brenham, Fukang and Imilac by optical and electron microscopy. Major and minor element compositions were measured with a Cameca SX100 electron microprobe. Trace elements were determined in selected kamacite grains using a New Wave 213 laser ablation system with an Agilent ICP-MS; ablation spot sizes were between 50-80 μm in diameter. Standards for the analyses were from the iron meteorites Hoba and North Chile (Filomena) and NIST steel.

**Results:** All data were within the range for main group pallasites, apart from Seymchan, which is known to have characteristics in common with the IIE irons. Trace element analyses of multiple kamacite grains in the samples show linear trends between elements, supporting formation by fractional crystallisation. Groupings of samples may be indicative of common parent bodies, with at least four bodies being represented by the meteorites analysed: (i) Brenham; (ii) Brahin, Hambleton and Imilac; (iii) Fukang and (iv) Seymchan.

**References:** [1] Malvin D. J. et al. 1985. *Meteoritics* 20:259. [2] Haack H. and Scott E. R. D. 1993. *Geochimica Cosmochimica Acta* 57:3457. [3] Mittlefehldt D. W. 1980. *Earth & Planetary Science Letters* 51:29. [4]. Clayton R. N. and Mayeda T. K. 1996. *Geochimica Cosmochimica Acta* 60:1999. [5] Greenwood R.C. et al. 2006. *Science* 313:1763. [6] Yang J. and Goldstein J. I. 2006. *Geochimica Cosmochimica Acta* 70:3197. [8] Campbell A. J. and Humayun M. 1999. *Analytical Chemistry* 71:939. [9] Campbell A. J. et al. 2002. *Geochimica Cosmochimica Acta* 66:647.