TEXTURAL EVIDENCE FOR MELT PROCESSES ON THE PALLASITE PARENT BODY

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Introduction: Pallasites are generally ~50:50 mixtures of iron-nickel metal and olivine; iron sulphides are normally present only as a minor phase. We have recently described [1] a new unusually sulphide-rich pallasite. Irregular distribution of its metal, sulphide and olivine yields clues to the origin and evolution of main group pallasites. It has been suggested [2,3] that cooling and evolving IIIAB iron metallic melt should form two immiscible liquids when the sulphur to phosphorous ratio exceeds 25. We have observed textures that support this view.

Observations: The meteorite has marginal, olivine-rich regions composed of sub-rounded, ~cm-sized crystals forming a granular mosaic. Towards the interior, this gives way to metal-rich or sulphide-rich regions in which the olivines tend to be fragmented, angular and smaller in size. There seems little doubt that where metal is host to angular olivine, the silicate was solid and brittle when enveloped in molten metal [4]. A similar textural relationship exists between olivine and sulphide, but the latter intrudes the olivines as fracture-filling veins <1mm thick that carry sub-rounded to angular sub-mm fragments of olivine. Sulphide veining commonly occurs to the exclusion of metal.

Discussion: The ability of sulphide to have been injected along sub-mm channels indicates that it was more fluid than metal. The tendency for metal and sulphide to be segregated is consistent with their occurrence as two immiscible liquids, as attested by the textural relationship between olivine fragments and metallic or sulphide hosts.

Conclusion: The new pallasite provides strong support for the separation of immiscible metallic and sulphide-rich liquids during pallasite genesis. Such evidence had previously been sought [3], but until now, was lacking.

References: [1] Abstract: Johnson D., Hutchison R., Grady M. M. & Kirk C. (*this volume*). [2] Űlff-M¢ller F. 1998. *Meteoritics & Planetary Science* 33: 207-220. [3] Űlff-M¢ller et al. 1998. *Meteoritics & Planetary Science* 33: 221-227. [4] Scott E.R.D. 1977. *Geochimica et Cosmochimica Acta* 47: 693-710.