Diversity of CB and CH chondrite metal

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CH and CB chondrites are related meteorite groups with extraordinarily high contents of metal (~20 vol. % in CH and ~60 vol. % in CB), bulk chemical compositions enriched in siderophile element abundances (Ir > ~2 x CI in CH [1], ~4-10 x CI in CB [2]), and some metal grains that are chemically zoned. These characteristics together with finding of isotopic zonation in chemically zoned metal grains [5] [6] indicate formation via a condensation process, either in the solar nebula or in an impact-induced vapor plume [2].

In this study metal grains from Acfer 214 (CH), Gujba and Bencubbin (CB_a), HaH 237 (CB_b), and the CB_b/CH breccia Isheyevo were analyzed with an electron microprobe. Metal compositions differ among different meteorites, but also within individual samples. In HaH 237, Acfer 214, and Isheyevo compositionally zoned metal grains were identified. Similar grains, however, are absent in CB_a chondrites (also [3]). Zoned metal grains have high Ni contents in the cores that decrease towards the rims. The zonation of Ni in metal grains of Acfer 214 and Isheyevo is less pronounced than in HaH 237.

The Ni/Co ratios of the zoned metal grains in CH and CB chondrites are described as being approximately solar [3] [4]. Our analyses reveal that zoned metal grains mainly have non-solar Ni/Co ratios that follow the zonation trend of Ni and are higher in cores than in rims. Such Ni/Co patterns in zoned metal were predicted by [6], if a condensation origin is assumed. Therefore, both high Ni contents and high Ni/Co ratios in cores can be taken as indicators for early condensed metal. To further refine the formation process of the metal grains and the origin of the CB and CH chondrites as a whole, we are in progress to analyze Ni- along with Fe isotopes of metals with LA-MC-ICP-MS. The coupling of Fe- and Ni isotopes, and with other siderophile elements will provide information on the origin of the different metal types [5].

[1] Bischoff et al. (1993) *GCA* **57**, 2631-2648. [2] Campbell et al. (2002) *GCA* **66**, 647-660.[3] Weisberg et al. (2000) *LPSC* #1466. [4] Meibom et al. (1999) *JGR* **104**, 22053-22059. [5] Zipfel & Weyer (2007) *LPSC* #1927. [6] Fedkin et al. (2015) *LPSC* #1038.