

NEW INFORMATIONS ON IMPACTITE PROCESSES FROM FENI METAL SPHERES.

C. Bender Koch, Chemistry Department, University of Copenhagen, Denmark (cbk@chem.ku.dk).

Introduction: Although it is generally accepted that the occurrence of micron-sized FeNi metal spheres are valid indicators of impacts caused by metallic meteorites, not much is known about the processes that affects the details of the spheres. To improve on this we have undertaken a systematic study of the metallic spheres emphasizing both the interior and the surface of the spheres. We isolated metallic spheres from an impactite bomb from Wabar crater in Saudi Arabia by crushing and following by collecting with a permanent magnet, and prepared polished thin sections of glass fragments containing FeNi spheres. The metallic spheres were used for FIB and TEM studies and spheres and sections were used for SEM.

Findings: The FeNi spheres commonly exhibit a decoration on the surface of the spheres due to accumulated FeS in the form of troillite (see Figs. 1 and 2). The regular patterns seems to be correlated with the occurrence of crystal aggregate boundaries, but highly chaotic FeS distributions are also observed. During polishing a number of metal spheres are removed from their positions within the glass by force and commonly FeS accumulations are found left in these depressions (Fig.1). This indicated that the troillite is only weakly bonded to the metal spheres and that the metal/iron sulphide represent an effective immiscible system during crystal growth of the metal from a melt. Occasionally voids (Fig 2) and troillite blebs are observed in the interior of the metallic particles, indicating growth related mass deficits and entrapment.

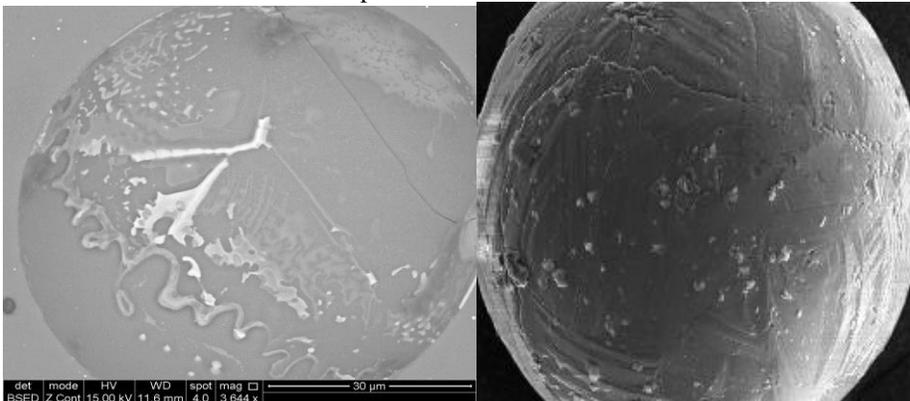


Fig. 1. Left: A hemispherical depression in the impact glass formerly occupied by FeNi metal spheres being decorated primarily with FeS showing both regular and chaotic patterns (BSE). Right: A FeNi metallic sphere decorated with FeS (troillite) (SE).

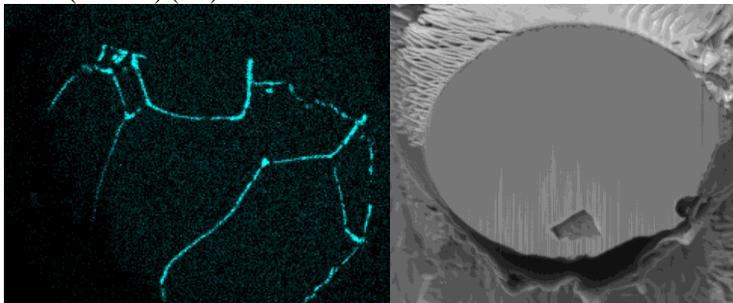


Fig. 2. Left: EDX mapping of S distribution on metallic FeNi showing a distinct pattern correlated with alloy crystal boundaries. Right: FIB sectioned FeNi metal sphere showing a void presumably related to crystal growth.