IMPACTITE VESICLES AS NUCLEATION SITE FOR MICRON SIZED FE-NI SPHERULES. C. Bender Koch[1] and T. Kasami[2], [1]Department of Chemistry, University of Copenhagen (cbk@chem.ku.dk), [2]CEN, Technical University of Denmark.

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Introduction: Impact derived micron-sized spherules of Fe-Ni alloys are commonly found within the glassy parts of impactites formed in craters originating from the fall of iron meteorites. Such spherules frequently show evidence of remelting and differentiation thought to driven by the high temperature of the silicate melt. In a recent study of vesicle details we found abundant vesicles having very smooth surface as might be expected if formed via exolution of gasses from a melt during a time of rapidly decreasing total pressure. However, we also observed abundant vesicles that featured Fe-Ni spherules partially embedded into the glass (Fig.1). The number of spherules within a vesicles varied from only a few to several hundreds, and mostly the spherules are deposited in quite a chaotic way, but partial order to highly ordered pearls-on-a-string deposits are also observed (Fig.2).

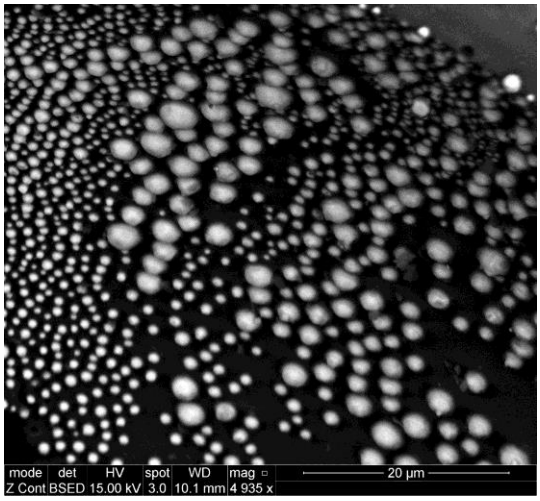

Fig.1. A fracture in Wabar impactite showing a hemisphere of a vesicle (back scatter mode). The white material between 1 and 5 microns in diameter deposited with partial order (strings) are metallic Fe-Ni spherules. Some spherules display angular faces.

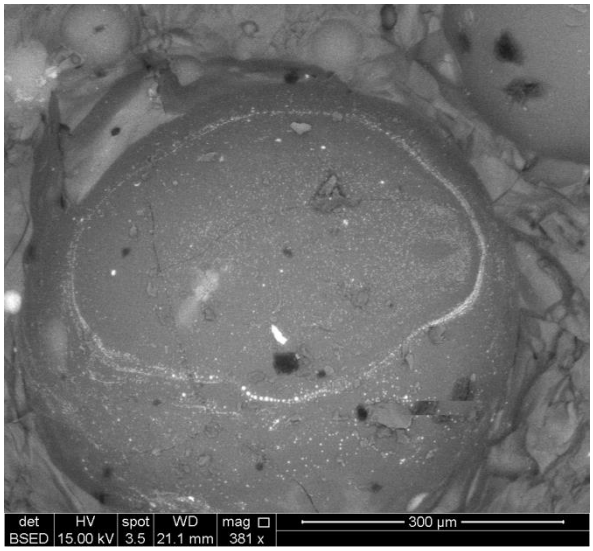

Fig.2. A fracture in Wabar impactite showing a hemisphere of a vesicle surrounded by fractured glass (back scatter mode). The white material running continuously over the surface is a pearl-on-a-string deposit of metallic Fe-Ni spherules.

The mode of formation of the Fe-Ni spherules are enigmatic. The fragility of the pearl-on-a-string structure imply that they are grown and organized inside the vesicle and the facetted surfaces imply a gas phase reaction. Because the spherules normally observed within the glass are an order of magnitude larger, one possible scenario would imply the evaporation of such a spherule inside the glass thereby forming both the vesicle and supplying metallic gas for growth from multiple nuclei. The spherules on the strings are separated, indicating that magnetic forces may stabilize their structure within free space of the vesicle. Another possibility is that they represent a small volume of metallic plasma trapped in the formation process of the impactite.