ON MODIFICATION OF TECHNIQUE FOR ESTIMATION OF IRON METEORITES COOLING RATES.

G. A. Yakovlev, R. F. Muftakhetdinova, E. V. Brusnitsina, V. I. Grokhovsky, Institute of Physics and Technology, Ural Federal University, Ekaterinburg, Russian Federation. E-mail: yakovlev.grigoriy@gmail.com.

Estimation of meteoritical cooling rates is a useful tool for better understanding of processes, which take place during differentiation of various parent bodies. Nowadays, there are at least 3 ways to calculate this parameter. One of them takes into consideration average particle size of high-nickel grains in cloudy zones. In this paper we suggest approach to modify abovementioned technique.

Iron meteorites, metal component of stony-iron meteorites and metal particles of undifferentiated meteorites contain peculiar textures formed due to slow cooling of molten Fe-Ni metal. One can find so-called cloudy zone, which consists of FeNi (tetrataenite) particles embedded in low-nickel matrix with typical ranges from tens to hundreds nanometers. It is considered that this texture was formed as a result of spinodal decomposition at temperatures below 400 °C in the area of M-shaped diffusion profile of nickel in the range from 30 to 42 wt.% Ni.

Spinodal decomposition forms periodical wave-like microstructure. So, it's possible to estimate period of these waves using the distance between centers of formed high-nickel particles. Images of cloudy zone in vicinity of outer taenite rim have been acquired using FE-SEM Carl Zeiss SIGMA VP. Measurements of periods have been done using SIAMS 700 image analysis system. Arrays of data in case of meteorites Annama (H5), Canyon Diablo (IAB-MG), Cheder (IID), Chelyabinsk (LL5), Hoba (IVB), Mundrabilla (IAB-ung), Odessa (IAB-MG), Seymchan (PMG), Sterlitamak (IIIAB), Uakit (IIAB) have been collected. Results of cooling rates analysis are compared with data from [1-3], which were obtained using measurements of average tetrataenite particle size in close proximity to tetrataenite – cloudy zone boundary.

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