ŁOWICZ METEORITE – MESOSIDERITE FROM VESTA.

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Introduction: Silicate materials in all mesosiderites show strong similarities to HED meteorites, while the Łowicz meteorite is unique in containing fragments of non-homogenised diogenite material. Such fragments are scattered through the meteorite as relics of up to several centimetres and as single orthopyroxene grains. Various fragments of the Łowicz meteorite vary significantly in their proportion of metal relative to silicates. The portion of the silicates that is represented by achondritic diogenite fragments is mainly comprised of orthopyroxenes. The more typical silicate portions of the Łowicz mesosiderite are composed of orthopyroxene, plagioclase and olivine.

Observations: The Łowicz meteorite represents a unique type of breccia where the silica phases consist of a mixture of clasts related petrologically close to the HED suite [1]. High precision oxygen isotopic measurements of mesosiderites and HED meteorites are identical, implying the same parent body [2]. The Vesta asteroid is the parent body of the HED meteorites [3],[4]. The lower crustal unit of Vesta composed of pyroxenite, from which diogenites originate, and an upper crustal unit that is the source of eucrites [5]. The association between HED meteorites and mesosiderites was strengthened with the discovery, within the Howardite, Dar al Gani 779, of a mesosiderite clast containing metal-rich inclusion and orthopyroxene and olivine fragments [6]. The investigations of an eucrite Dhofar 007 resulted in another scientific hint for possible genetic relationship with mesosiderites [7].

Conclusions: The specific petrogenesis of the Łowicz meteorite is complex. It may be assumed that its structure and composition are a result of the mixing of metal with remnants of rocks originating at various depths. This is strongly suggested by the general lack of equilibrium between the olivine, pyroxene and metal phases. However, localized partial melting and crystallization of pyroxene and olivine, already in equilibrium with the metal phase, could also have occurred. Probable relics of later impact melting have also been noted in the Łowicz meteorite.

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