

NEW DATA ON GRAPHITE FROM THE ZAKŁODZIE ENSTATITE ACHONDRITE.

T. A. Przylibski¹, T. Jakubowski², Ł. Karwowski³, R. Kryza⁴, K. Łuszczek¹. ¹Wrocław University of Technology, Faculty of Geoengineering, Mining and Geology, Wybrzeże S. Wyspiańskiego 27, 50-370 Wrocław, Poland; ²Balonowa 5/2, 54-129 Wrocław, Poland; ³University of Silesia, Faculty of Earth Sciences, ul. Będzińska 60, 41-200 Sosnowiec, Poland; ⁴University of Wrocław, Institute of Geological Sciences, ul. Cybulskiego 30, 50-205 Wrocław, Poland.

Introduction: Zakłodzie is one of the ungrouped enstatite achondrites. It was classified by some authors [1, 2] as an impact-melt rock, but others (T. A. Przylibski & research team) have suggested that a new meteorite group of primitive enstatite achondrites can be defined. They proposed to include into that group, apart from Zakłodzie, several other enstatite meteorites, e.g.: Happy Canyon, Ilafegh 009, QUE 94204 and Yamato 8404 [3–5]. Zakłodzie has an extraordinary mineral composition, comprising e.g. keilite [5] and, in the innermost part, spherical nodules of graphite and metal, surrounded by enstatite crystals. Both, inclusions of graphite in metal grains and metal grains in graphite are found. These kinds of inclusions are important for establishing the temperatures of metamorphism leading to chondrule borders effacing and recrystallization of plagioclase II [4]. Further constraints on the crystallization temperature can be inferred from determination of the graphite structure.

Samples and Experiments: Analyses were made on a fragment of the innermost part of Zakłodzie, a few cm² in size. Element mapping was done on SEM JEOL JSM-5500LV. Raman spectra were obtained on confocal microspectrometer T-64000 (Jobin-Yvon) equipped with microscope Olympus BX-40; the 514.5 nm Ar line was used for sample excitation. X-ray powder diffraction analyses were performed on X'Pert Philips PW 3710 diffractometer (Co K α).

Results: Element mapping shows that carbon nodules are set in iron or, locally, enclosed in silicate minerals. The diameters of the nodules are between 0.1 and 4 mm (exceptionally, up to 9 mm). Graphite was observed in association with all other mineral components of the meteorite, i.e. sinoite, schreibersite, troilite, enstatite and FeNi phases. The Raman spectra show graphite lines at 1580 cm⁻¹ for G band, and 1355 cm⁻¹ for D band; they also show broad peaks at 2700 cm⁻¹. According to Lespade method [6], the graphite from Zakłodzie is determined as semi-ordered to ordered. X-ray diffraction results confirm the hexagonal structure of alphasgraphite. Further investigations are in progress to establish more detailed structural characteristics of the Zakłodzie graphite.

References: [1] Burbine T. H. et al., 2000. *Meteoritics & Planetary Science* 35:A36. [2] Keil K. and Bischoff A., 2008. *Meteoritics & Planetary Science* 43:1233–1240. [3] Pilski A. S., 2004. 3rd Meteorite Conference in Poznań. pp.41–46. [4] Przylibski T. A. et al., 2005. *Meteoritics & Planetary Science* 40:A185–A200. [5] Karwowski Ł. et al., 2007. *American Mineralogist* 92:204–209. [6] Lespade P. et al., 1982. *Carbon* 20:427–430.