THE IMPACT MECHANICAL TESTS OF SEYMCHAN AND CHINGA METEORITES.

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Introduction: There are very limited data about mechanical properties and behavior of meteorites udder impact load while its chemistry and mineralogy have been studied widely. [1-3]. Majority of strength data were obtained from compressive tests while only a few data were performed with tensile tests. In separate works results of impact tests of an iron-stony meteorite of Hembury are presented at temperatures T= 300K (KCU^{300} = 339kJ/m^2) and T = 195K (KCU^{195} = 84,8kJ/m^2) [4].

Experimental: Dynamic tests of meteoritic materials were performed using instrumented Tinius Olsen IT542 impact test machine at temperature range of 300 and 193 K. Samples were prepared from Chinga ataxite and metal part of Seymchan PMG. Scanning electron microscopes JEOL JSM-66490LV and TESCAN VEGA were used for fracture surface analyses of studied materials.

Results and Discussion: A subject of the research were substances of Chinga and Seymchan meteorites, which have been tested according to requirements of GOST9454 of impact strength in the range of temperatures 193...300 K. The sizes of impact test specimen with an U-notch of 2 mm in depth were 10x10x55 mm. According to experimental data presented in figure below temperature dependences of impact strength vs test temperature for two types of meteoritic material have identical character. Both materials show the expressed ductile to brittle transition in the area of temperatures 233…253 K.

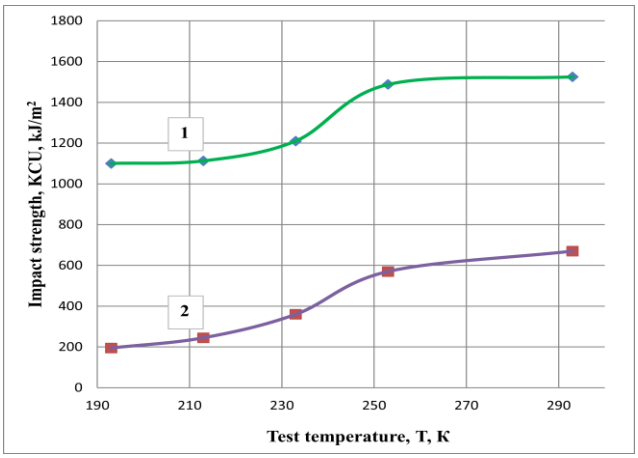

Figure – Temperature dependence of Chinga (1) and Seymchan (2) meteoritic materials impact strength

At the same time in all studied temperature interval KCU values of Chinga material meteorite are significantly higher in comparison with Seymchan meteorite. Fractographycal observations of meteorites impact specimen surface have shown that higher values of impact strength of Chinga meteorite are associated with dominating viscous dimples fracture mechanism of this material. However with lowing of temperature the size of viscous dimples significantly decreases and at a temperature of 193 K quasi-cleavage sites appear on the specimens surface. As compared with Chinga meteotite the fracture relief of Seymchan meteorite impact specimen has more non-uniform structure. It should be noted that brittle fracture elements may be found on specimens surface of Seymchan meteorite after impact tests at all the investigated temperatures.

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