Discovery of Upper-Going Intrusive Complex of Ultrahigh Pressure Impact Melt Glasses in Kara Astrobleme.

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During our field works in 2015 and 2017 at the giant unique diamond-bearing Kara astrobleme (Pay-Khoy, Russia) followed by detail complex studies a novel impact-originated ultrahigh pressure high temperature (UHPHT) intrusive upper-going impact melt complex has been discovered [1, 2]. The UHPHT glasses form systems of vein bodies up to 10 cm in thickness subvertically crossing an upper layer of the suevite massive (Fig. 1A, B). The glasses are characterized mainly by aluminasilicate content with silica melt drops with widely spread coesite (Fig. 1 C, D, 2). The special feature of the discovered glasses is liquation structure presented with bisilica melt, differentiated to SiO_2+coesite and SiO_2+coesite+H_2O+CH components [2]. Additionally, they contain after-coal diamonds of the varieties [3], including first time described after-organic paramorphs, and also, Fe^{2+} 8-fold co-ordination in glass network [2] that has been described earlier neither in synthetic nor natural glasses. According to our observations of mineral phases relations we have found the following solidification sequence of the UHPHT impact melt: coesite–silica glass–albite glass–pyrite.

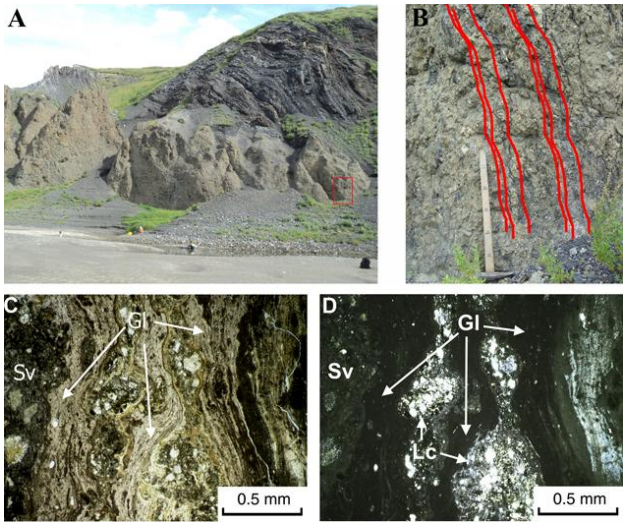

Fig. 1. Massive impactite with vein-like ultrahigh pressure melt glasses in contact with black shales of the Kara astrobleme target (A). B – magnified part (red square in (A)), red lines tracing the vein-like bodies of UHPHT melt glasses. C, D – thin sections in transparent light, C – parallel, D – crossed polarizers; UHPHT glass (Gl) in suevite (Sv) transporting lithoclasts (Lc). The detail explanations are presented in [1].

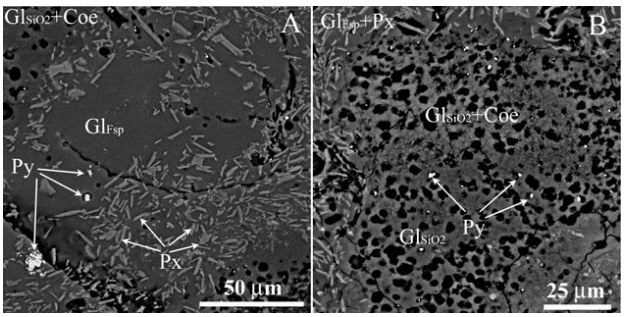

Fig. 2. SEM images UHPHT impact glass from a vein body described in [1]. (A) aluminosilicate glass with some pyroxene crystallites, (B) coesite-bearing silica glass drop within aluminosilicate glass surrounding matter. Black rounded regions in (B) are pores, produced probably at vacuum probe preparing by recovering of liquid-(water-)rich inclusions in glass. Gl_{Fsp} and Gl_{SiO2} – glass from feldspar and quartz melting, Coe – coesite, Px – pyroxene, Py – pyrite.

The discovered UHPHT impact glass upper-going complex and liquation of the impact melt have a principle value for developing of the impact craters model either directly for the Kara astrobleme or for impact craters as a whole.

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References:

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