STUDY OF SHOCK COMPRESSED SiO_2 AEROGEL BY SYNCHROTRON RADIATION

Bespalov E. V.[1*], Efremov V.P.[1], Fortov V.E.[1], Luk'yanchikov L.A.[2], Merzhievsky L.A.[2], Pruuel E.R.[2], Ten K.A.[2], Titov V.M.[2], Tolochko B.P.[3], Zhogin I.L.[3]

[1]*Joint Institute for High Temperatures, Russian Academy of Sciences, Moscow, Russia*

[2]*Lavrentyev Institute of Hydrodynamics, Siberian Branch of RAS, Novosibirsk, Russia*

[3]*Institute of solid State Chemistry and Mechanochemistry, Siberian Branch of RAS, Novosibirsk, Russia*

**bev@ihed.ras.ru*

Porous materials have been found wide application in the constructions, which were working under high energy and power loading. Promising porous material is quartz SiO_2 - aerogel. In this work the possibilities of synchrotron radiation (SI) were used for investigating the behavior of aerogel under the shock-wave loading. Also its structural and quasi-static mechanical properties were deter-mined.

The SI-application for detonation and shock-wave processes investigations were described in [1-3]. Shock wave in the studied sample was generated by the impact of the flat plate, accelerated by the products of explosive detonation through air gap. Especial compact explosive generator was developed for impactor accelerating. The diameter of cylindrical impactor was carried from 15 to 20 mm. The impactor velocities lay in the interval of 300-2200 m/s in the dependence on thickness and impactor material. The SI beam was used for measuring the current parameters of shock-compressed aerogel.

In the same experiment we measured the shock wave velocity in the target (D), the mass velocity (U), which was equal to the current flight velocity of im-pactor and the initial impactor velocity (W). Besides we directly measured width of shock wave front and compressed aerogel density. Initial aerogel densities were 0,25 g/cm^3 and 0,15 g/cm^3.

Obtained data made it possible to reliably build points on Hugoniot curve of aerogel target. Later these dates will be used for constructing the SiO_2 - aerogel equation of state.

Work had been done due to partial support of RAS presidium program.

1. Ten K. A. a.o. // FGV, 2001, № 5, V. 37, p. 104-113.
2. Merzhievsky L. A., Ten K. A. a.o. // FGV, 2003, № 2, V. 39, p. 137-139.
3. Merzhievsky L. A., Ten K. A. a.o. // Questions of atomic science and technol-ogy, ser. Materials science and the new materials, 2004, v. 2(63), p. 383–391.