Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Spall strength, dynamic elastic limit and fracture of ittrya dopped tetragonal zirconia[1] VLADIMIR MILYAVSKIY, JIHT RAS, ANDREY SAVINYKH, IPCP RAS, THOMAS SCHLOTHAUER, TU Bergakademie Freiberg, EVGENY LUKIN, MUCTR, FELIX AKOPOV, JIHT RAS — Specimens of the ceramics based on zirconia partially stabilized by yttrium oxide of the composition of 97 mol % ZrO_2+3 mol % Y_2O_3 were prepared. The densities of the specimens were 5.79 and 6.01 g/cc. The ceramics mainly have the tetragonal structure (93-98 wt. % of t-ZrO_2). The mechanical action on the ceramic activates the transformation of the tetragonal phase into the monoclinic one: at the abrasive cutting or at the fracture by hammer shock, the content of the monoclinic phase is increasing. The same trend was observed in the specimens, recovered after stepwise shock compression up to 36, 52 and 99 GPa. It was found that shock compression do not initiates tetragonal-monoclinic phase transition directly, and this transition is caused by the destruction. Recovered specimens do not reveal any traces of the phase change which was observed by Mashimo et al. under the pressures 30-35 GPa (J. Appl. Phys. 1995. V. 77. P. 5069). Recording of the profiles of the free surface velocity of the specimens during single-stage shock compression allowed us to determine the dynamic elastic limit, as well as spall strength of the material versus maximal shock stress. In addition, the ceramics were subjected to the action of low temperatures. There were no significant changes in the specimens recovered after storage in liquid nitrogen and helium.

[1]The work was supported by The State Atomic Energy Corporation ROSATOM.

Vladimir Milyavskiy
JIHT RAS

Date submitted: 21 Feb 2013 Electronic form version 1.4