# Hardness and damage of the U-Fe-Ge alloy sphere under explosive loading

D.A. Belyaev, A.S. Aleksandrov. Yu.N. Zuev, E.A. Kozlov,
S.A. Lekomtsev, A.S. Nedosviti, I.L. Svyatov, E.A. Levi

*Russian Federal Nuclear Center- Zababakhin All-Russia Research Institute of Technical Physics*
*Snezhinsk, Chelyabinsk region, 456770, Russia*

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*e-mail: bad1331@gmail.com

The paper presents the metallography analysis results for the structural state of the three-phase U-Fe-Ge alloy sphere (Figure 1) recovered under the symmetrical explosive loading by converging shock waves (Figure 2). The sphere initial geometry and the loading conditions are identical to that of the unalloyed plutonium sphere studied in [1]. The analysis was carried out using light microscopy and scanning electron microscopy, microhardness testing combined with digital mapping of the observed physical magnitudes [2].

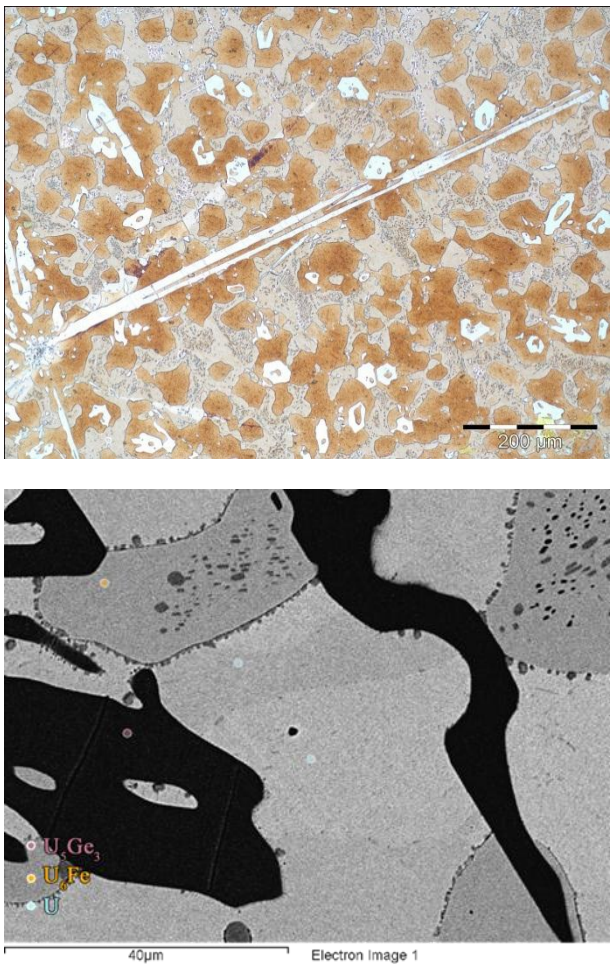


*Figure 1*. Three-phase microstructure of the alloy U-Fe-Ge

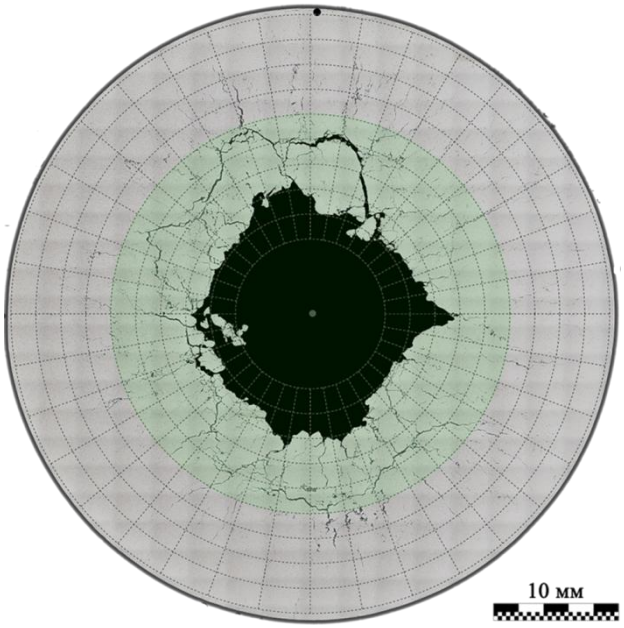


*Figure 2*. Damage in the meridional section of the sphere due to the explosive loading

Statistic and spatial distributions of damage, microhardness and hardness in the meridional section of the sphere, as well as changes in the microstructructural state were obtained and analyzed. The material fracture behavior was determined and the pattern of its localization along the radius was identified.

[1] Kozlov E.A., B.V. Litvinov, L.V. Timofeeva. Structural and phase transformations, spall and shear fractures in the sphere of unalloyed plutonium under explosive loading. *Litvinov B.V. Selected works*. — 2014. http://elib.biblioatom.ru

[2] D.A. Belyaev, Yu.N. Zuev, A.V. Lukin, I.L. Svyatov. Application of the colour mapping technique in the metallography analysis of the samples under dynamic loading. *Industrial laboratory. Material diagnostics*. #6, **V. 82,** 2016. P. 40-43.