

## FORMATION OF DIAMOND-LIKE CARBON DURING SHS

*N. I. RADISHEVSKAYA, A. Y. NAZAROVA, O. V. L'VOV, R. V. MININ*

*Tomsk Scientific Center SB RAS, Tomsk, Russia*

In the preparation of alumomagnesian spinel  $\text{MgAl}_2\text{O}_4$  by self-propagating high-temperature synthesis in the  $\text{MgO-Al}_2\text{O}_3\text{-Mg(NO}_3)_2\cdot 6\text{H}_2\text{O-Al}$  system with boron additives (1, 2, 4 wt.%) an admixture of carbon was found in the synthesis products, which is not contained in the initial reagents. The phase composition of the samples was studied (diffractometer "DRON-2M"). Figure 1 shows micrographs of SHS products of alumomagnesian spinel with 2% by weight. boron in the charge. Numerous crystals were found in some places of the spinel matrix. The morphology of the sample surface was studied using a Philips SEM 515 scanning electron microscope equipped with an EDAX local microrentgenospectral analysis system. The EDS analysis showed that the crystals are composed of carbon. Using IR spectroscopic analysis (Nicolet 5700 IR Fourier spectrometer), it was found that carbon has a diamond-like lattice, similar to the lattice of detonation diamonds [1,2].

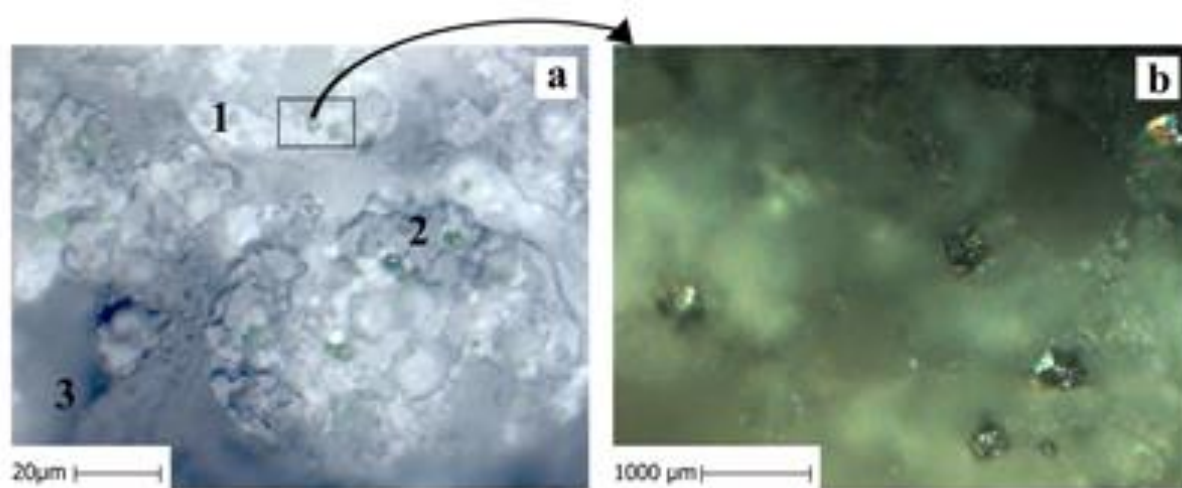


Fig.1. SEM images (a) of magnesium aluminate spinel produced by SHS with the addition of 2 wt.% boron, where (1) is spinel, (2) is crystals, (3) is pore (epoxy resin); the marked area (b) shows a cross section with the crystals. (Axiovert 200M).

Gases released during combustion were studied using a high-resolution spectrometer Ocean Optics HR4000 CG-UV-NIR. Gorenje. It was found that mainly molecular bands of hydrogen are present in the selective spectrum of gases. Low-intensity atomic emission lines of Al, O (of varying degrees of ionization) and helium He are observed, the atomic line of which was determined at 355.44 nm. It is shown that under certain conditions, a low-energy nuclear reaction (boron-proton reaction) takes place in the combustion wave in high-speed SHS processes[3].



In the conducted syntheses of spinel with different boron content, LENR reactions are local in nature, i.e. they occur in separate foci. Based on the experimental data obtained, the most probable mechanisms of carbon formation in synthesis products are formulated and proposed.

## REFERENCES

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