APPLICATION OF ELECTROMAGNETIC FIELDS FOR MODIFICATION OF COMPOSITE MATERIALS

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The TiB_2–TiC composites are promising as constructional radiation protective material because of their good radiation-resistant properties. We considered the results of action of low electric fields with energy $h\nu \approx 1.1\times10^{-5}$ eV as well as 1.9 MeV electron beams on the composite material.

We investigated the effect of non-heating microwave irradiation on composite parameters. Changes of parameters were detected in the material studied for 10-15 min. after termination of radiation. The total heating of the sample in the course of irradiation did not exceed 10 °C. A possibility of annealing of reactive pressed composites using low-dose microwave irradiation was found [1].

It is shown that high-energy irradiation results in modification of not only irradiated side of the sample but its opposite side as well. This indicates possible migration of carbon atoms to the opposite side of the sample. Some structural-phase transformations occur under electron irradiation. They lead to reduction of intrinsic stresses and can extend service life of irradiated material.

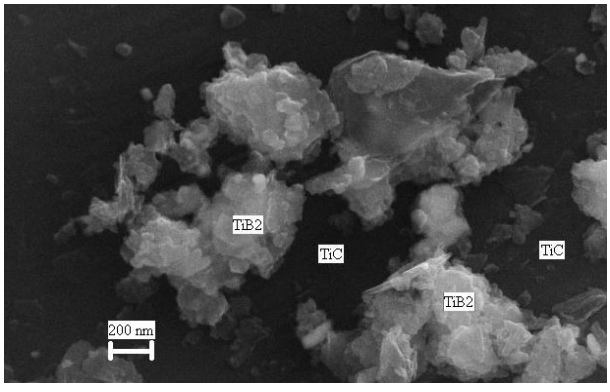

Fig. 1 Microphotograph of initial composite structure

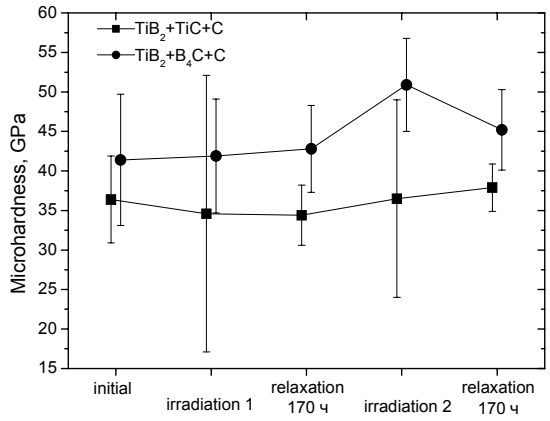

Fig. 2 Effect of microwave irradiation on microhardness of TiB_2 composite formed by reactive pressing using reaction $2TiC + B_4C \rightarrow 2TiB_2 + 3C$ (with excess of each component)

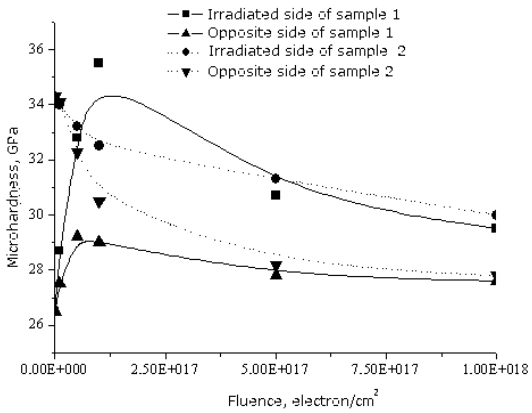

Fig. 3 Effect of 1.9 Mev electron irradiation on TiB_2 + TiC samples. The initial phase ratio: 66:34 (sample 1), 74:26 (sample 2)

1. O.E. Belyaev, V.V. Shynkarenko, I.M. Totsky, V.A. Makara. Method of fabricating radiation-resistant carbide- and boride-based composite materials using microwave treatment. Patent of Ukraine № 67488 (27.02.2012).