# PLASMADYNAMIC SYNTHESIS OF TI-B NANOPOWDERS

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Titanium diboride TiB2 has many attractive properties including high hardness, high elastic modulus, high melting point and high temperature oxidation resistance. The oustanding physical and mechanical properties of TiB2 allow for various applications across many areas, e.g. military, aerospace or automotive applications. The present paper reports a novel way of direct and quick making nanodispersed Ti-B phases out of amorphous boron powder (B) and crystalline titanium (Ti). A hypersonic plasma jet was generated by a coaxial magnetoplasma accelerator. An amorphous boron powder was placed axially into a plasma formation zone as a precursor of a chemical reaction. After emergence of the discharge a plasma jet was accelerated by an own magnetic field and the magnetic field of external inductor. The accelerated plasma jet flew to a working chamber filled with argon. Accelerator was powered by a capacitive energy storage, the level of released energy reached Wr = 33.5 kJ. The synthesized powders were analyzed by the X-ray diffraction (XRD) method. The XRD analysis showed that the products mainly contain boride of titanium and diboride of titanium. The preferential content of borides in the products compared with diboride is explained by the certain ratio of boron and titanium for respective phases in accordance with the Ti-B state diagram – 20 % of boron in the system. The products contain pure titanium, so this fact and the absence of pure boron in the products demonstrate the redundancy of titanium in the system.

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