

Original article

УДК 669.01

Composites Fabricated by Ball Milling of Al With Nano H-Bn and Followed by Spark Plasma Sintering

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Abstract. Al/h–BN composites with high strength were fabricated by a combination of ball milling and spark plasma sintering using nano Al and nano BN powders.

Keywords: aluminium, boron nitride, ball milling, sintering, tensile strength

Funding. The work was carried out with the financial support of CzechNanoLab, MEYS CR (LM2018110) and the OPVVV project “New nanostructures for engineering applications” No. CZ.02.1.01/0.0/0.0/16_026/0008396.

Научная статья

Композиты Al_{нано}/h–Bn_{нано} изготовленные методом шарового размла и искрового плазменного спекания

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Аннотация. В работе изучено получение высокопрочных композитов на основе Al/h–BN, изготовленных путем сочетания шарового размола и искрового плазменного спекания с использованием порошков Al_{nano} и h–BN_{nano}.

Ключевые слова: алюминий, нитрид бора, шаровой размол, спекание, прочность на растяжение

Финансирование. Работа выполнена при финансовой поддержке CzechNanoLab, MEYS CR (LM2018110) и проекта OPVVV «Новые наноструктуры для инженерных приложений» № CZ.02.1.01/0.0/0.0/16_026/0008396.

The use of oxide, nitride, carbide, and boride nanoparticles (NPs) in Al-based metal matrix composites (MMCs) is a promising technique for restricting dislocation motions and thereby boosting material strength via dispersion hardening.

The goal of this research is to use a combination of ball milling (BM) and spark plasma sintering (SPS) to create Al/h–BN composites with excellent strength utilizing nano Al and nano BN powders. The combination of two types of nanopowders is aimed to provide a uniform distribution of the reinforcing phases and increase the Al-BN chemical interaction during the BM and SPS stages by boosting the surface-to-volume ratio.

The tensile and compressive strength of the resulting Al/h–BN composites are measured at 25, 300, and 500 degrees Celsius. The combination of high strength and ductility of the composite was described based on the investigation of phase transitions in the Al/h-BN system at a temperature 30 °C below the Al melting point.