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Microstructure and Mechanical Properties of Multilayer α -AlN/ α -BCN Coating as Functions of the Current Density during Sputtering of a B₄C Target(Article)

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Краткое описание

Multilayer AlN/BCN coating of nanometer scale have been prepared by magnetron sputtering of Al and B₄C targets in an argon–nitrogen atmosphere during deposition on a Si substrate. These coating have an X-ray amorphous structure and the maximum Knoop hardness of 27 GPa (at the current density 100 mA). The first-principle molecular dynamics calculations show that the B₄–BN layer is dynamically unstable; thus, it will not be epitaxial and will be amorphous or have a structure different from the B₄–BN structure. The thermal vacuum annealing from 600 to 800°C of samples with multilayer nanosized coating leads to the decrease in the Knoop hardness to 18 GPa; however, the coating structure is retained X-ray amorphous. © 2018, Pleiades Publishing, Ltd.