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# Stoichiometric and structural controlling of boron carbide thin films by using boron-carbon dual-targets

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## Abstract

The stoichiometry of boron carbide thin films was controlled in the range of 0.1~8.9 and 3.04 ~ 5.92 via pulsed laser deposition by using SPSed- (Spark Plasma Sintered) and dual-targets, respectively. The amorphous films sized 50 nm in thickness. In the case of dual-target, the reaction rate of boron and carbon atoms increased with the increasing of target rotating speed. Uniform, layered and FGM (Functionally Graded Materials) B-C thin films can be obtained by controlling this reaction rate. Two kinds of structural evolutions have been found by investigation of bonding environments in as-deposited thin films via XPS (X-ray photoelectron spectroscopy) study. With decrease of B/C ratio, films deposited from SPSed-target show the $B_{11}C$-CBB→$B_{11}C$-CBC transformation. In contrast, the films deposited from dual-target present the $B_{11}C$-CBB→$B_{10}C_2$-CBB structural change. Also, the deposition mechanism of films by this novel dual-target has been discussed.

**Keywords:** boron carbide; stoichiometry; structure; hybridization; dual-targets; PLD (Pulsed laser deposition)

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