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Hydrogen Effects on Properties of ICP Sprayed Boron Carbide Coatings

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Boron carbide (B4C) is low-Z material with good chemical stability and effective neutron absorption, so it has received attention for application in nuclear fusion reactors and plasma facing material in fusion devices. B4C coatings are successfully deposited by inductively coupled plasma (ICP) torch, and the results indicate that plasma gas composition has great affection on melting process of B4C powders and also the properties of B4C coatings. In this work, the boron carbide coating with low porosity, high biding strength and good performance of thermal shock behavior is deposited by the control of content of hydrogen in plasma gas. Surface morphologies of coatings are characterized by scanning electron microscope (SEM). The porosity is measured by picture of polished coating taken by optical microscope. The biding strength of coating is obtained through tensile test. A system including electron beam welding machine and water-cooling platform is used to test the thermal shock behavior of coating. The results show that adding hydrogen to the plasma gas is able to improve the properties of spray coating. The relationship between the properties of boron carbide coating and content of hydrogen in plasma gas is discussed.

Eligible for student paper award?

Yes

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