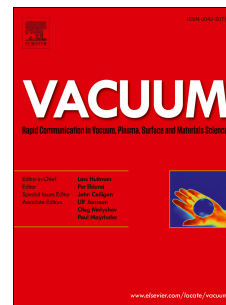


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Ablation performance of supersonic atmosphere plasma sprayed tungsten coating under oxyacetylene torch and plasma torch

Ling-jun Guo^{a*}, Jian peng^a, Chen Guo^b, Cai-xia Huo^a, Run-jun Sun^b, Yi-xin Zhang^b

^a*The State Key Laboratory of Solidification Processing, C/C Composites Technology*

Research Center, Northwestern Polytechnical University, Xi'an 710072, China

^b*School of Textiles and Materials, Xi'an Polytechnic University, Xi'an, 710048, China*

Abstract

Tungsten (W) coating was prepared on SiC coated C/C composites by supersonic atmosphere plasma spraying (SAPS), aiming to improve their anti-ablation property. Under oxyacetylene torch, W coating could protect substrate above 60 s under heat flux of 2400 kW/m². However, oxidization destroyed the intergranular and interlayer bonding of as-sprayed W coating during ablation. As a result, when heat flux of oxyacetylene torch raised to 4200 kW/m², huge thermal and mechanical shock made W coating delaminate severely, which lead to the failure of W coating after ablated for only 30 s. During plasma ablation, argon gas offered an inert environments, which restrained oxidization of W coating. Thus, even if the temperature and mechanical erosion of plasma torch were much higher than oxyacetylene torch, W coating can successfully protect substrates above 40 s, exhibiting excellent ablation performance.

Key words: Tungsten coating; Supersonic atmosphere plasma spraying; Ablation resistance; Carbon/carbon composites; Silicon carbide

1 Introduction

Carbon/carbon (C/C) composites are promising candidates as high-temperature

*Corresponding author: Tel.: +862988494197; E-mail address: guolingjun@nwpu.edu.cn (L.J. Guo).

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