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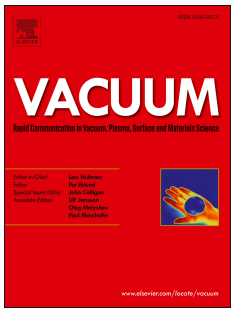

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Ablation performance of supersonic atmosphere plasma sprayed tungsten coating under oxyacetylene torch and plasma torch

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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/m^2. 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/m^2, 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

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