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细编穿刺碳 / 碳复合材料超高温氧化机理研究

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OXIDATION BEHAVIOUR OF 3D FINE WEAVE PIERCED CARBON CARBON COMPOSITES AT ULTRA HIGH TEMPERATURES

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摘要 研究了细编穿刺碳 / 碳复合材料高达３０００℃下的氧化与烧蚀。根据ＸＰＳ，ＳＥＭ和ＸＲＤ对烧蚀产物的微观分析建立了相应的非平衡烧蚀模型，提出了碳氧化的微观机理，探讨了扩散控制和反应动力控制对Ｃ／Ｃ复合材料氧化与烧蚀规律的影响

关键词： 碳 / 碳复合材料 耐氧化性微观结构

Abstract： The oxidation resistance of 3D C C composites consisting of woven layers of orthogonal fibers in XY plane pierced by fibers in the Z direction at temperatures up to 3000℃ has been investigated. Scanning electron microscopy and X ray photoelectron spectroscopy were used to describe the reactivity of carbon carbon composites. The oxidation mechanism and the influence of microstructure on the reactivity of composites were discussed. The thermochemical ablation was simulated by direct passage of electrical current through the sample in the vacuum. The results show that the oxidation of the C C composites at ultra high temperatures is a non equilibrium process. Generally, the oxidation process is controlled by both gas phase diffusion and reaction kinetics at high temperatures, but only by gas phase diffusion at ultra high temperatures because of the CO CO 2 gas phase layer on the surface of the sample.

Keywords： Tcarbon-carbon composites oxidation resistance microst ructure

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