

论文

耐超高温SiC(AI)纤维先驱体——聚铝碳硅烷纤维的研究

郑春满, 李效东, 余煜玺, 王浩, 曹峰, 赵大方

国防科技大学航天与材料工程学院国防科技重点实验室; 国防科技大学航天与材料工程学院国防科技重点实验室 长沙

收稿日期 2005-3-30 修回日期 2005-5-8 网络版发布日期 接受日期

摘要 以聚硅碳硅烷(PSCS)与乙酰丙酮铝($Al(AcAc)_3$)为原料,在常压高温条件下反应制备出聚铝碳硅烷(PACS),经过熔融纺丝制备了PACS纤维.应用GPC、IR、XPS、 ^{29}Si -NMR、 ^{27}Al -NMR、TG、SEM、元素分析和增重等一系列分析,分别对PACS纤维的微观组成、结构以及性能进行了分析.研究表明,以原料质量配比为6:100($Al(AcAc)_3$:PSCS)合成的PACS化学式为 $SiC_{2.0}H_{7.5}O_{0.13}Al_{0.018}$,数均分子量为1700左右,最适宜制备PACS纤维;PACS纤维中主要存在 SiC_4 、 SiC_3H 等结构,同时存在 $Si-O-Al$ 键;在氮气气氛中,PACS纤维的陶瓷产率达到52%左右;预氧化处理,PACS纤维中 $Si-H$ 键与空气中的氧反应形成 $Si-O-Si$ 交联结构,较聚碳硅烷(PCS)纤维易于氧化,经过预氧化的PACS纤维陶瓷产率达到80%左右,是制备耐超高温SiC(AI)陶瓷纤维的合适纤维;用预氧化PACS纤维制备的SiC(OA1)纤维和SiC(AI)纤维抗拉强度高,耐高温性能好.

关键词 [聚铝碳硅烷](#) [SiC纤维](#) [制备](#) [耐高温](#) [预氧化](#)

分类号

STUDY OF HIGH TEMPERATURE RESISTANT SiC(AI) FIBERS PRECURSOR— POLYALUMINOCARBOSILANE FIBERS

ZHENG Chunman,LI Xiaodong,YU Yuxi,WANG Hao,CAO Feng,ZHAO Dafang

Key Laboratory of national Defense Technology; College of Aerospace & Material Engineering; National University of Defense Technology; Changsha 410073

Abstract Polyaluminocarbosilane(PACS) was synthesized by reaction of polysilocarbosilane(PSCS)with $Al(AcAc)_3$, (AcAc: acetylacetonate)at normal pressure and high temperature,then PACS fibers were prepared through melt spinning of PACS. The composition and structure of PACS fibers were examined by measurements of element analysis,GPC,XPs,IR, ^{29}Si -Solid NMR and ^{27}Al -Solid NMR; the properties of PACS fibers were studied by TG,IR,weight gain and SEM. PACS synthesiznd through the reaction of $Al(AcAc)_3$ with PSCS by mass ratio of 6: 100 was best fitting for preparing PACS fibers. Its empirical formula was $SiC_{2.0}H_{7.5}O_{0.13}Al_{0.018}$ and the molecular weight was about 1700. The chemical structure unit included SiC_4 , SiC_3H etc,and $si-O-Al$ bonds also existed in the PACS fibers. Under nitrogen atmosphere,the ceramic yield of PACS fibers was about 52%; during the curing process of PACS fibers in air. the $Si-H$ bond reacted with oxygen,and $Si-O-Si$ bond was formed. The ceramic yield of cured PACS fibers was about 80% and the properties of SiC(OA1)and SiC(AI)ceramic fibers were excellent. It was proved that PACS fibers were very fitting for making SiC(OA1) and SiC(AI)ceramic fibers.

Key words [Polyaluminocarbosilane](#) [SiC fibers](#) [Preparation](#) [High temperature resistance](#) [Curing](#)

DOI:

通讯作者 李效东

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(724KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“聚铝碳硅烷”的 相关文章](#)

▶ [本文作者相关文章](#)

- [郑春满](#)
- [李效东](#)
- [余煜玺](#)
- [王浩](#)
- [曹峰](#)
- [赵大方](#)