

## 气体滞留时间对微波热解CVI工艺制备C/C复合材料性能的影响

邹继兆<sup>1</sup>, 曾燮榕<sup>2,3</sup>, 熊信柏<sup>2,3</sup>, 谢盛辉<sup>2,3</sup>, 唐汉玲<sup>1</sup>, 李 龙<sup>1</sup>

1. 西北工业大学材料学院, 西安 710072; 2. 深圳大学材料学院, 深圳 518060; 3.

深圳市特种功能材料重点实验室, 深圳 518060

收稿日期 2006-8-24 修回日期 2006-10-19 网络版发布日期 2007-7-5 接受日期

**摘要** 以炭毡为预制体, N<sub>2</sub>为稀释气体, 甲烷为炭源先驱体, 其分压为10kPa, 沉积温度为1100℃的工艺条件下, 研究了不同的气体滞留时间(0.05、0.1、0.15、0.2s)对微波热解CVI工艺制备炭/炭复合材料的致密化速率、样品的体积密度及其密度均匀性的影响, 并对其组织结构进行了观察. 分析了气体的滞留时间对微波热解CVI工艺制备炭/炭复合材料的影响规律及组织结构的变化. 结果表明: 采用微波热解CVI工艺在1100℃90h内制备出体积密度为1.70g·cm<sup>-3</sup>的炭/炭复合材料, 在滞留时间为0.15s时预制体呈现从内到外逐步致密的规律. 同时, 随着滞留时间的延长, 热解炭的组织结构从低织构到中等织构变化.

**关键词** [炭/炭复合材料](#) [微波热解CVI](#) [滞留时间](#) [致密化](#)

**分类号** [TB332](#)

## Influence of Gas Residence Time on Properties of C/C Composites Prepared by Microwave Pyrolysis CVI

ZOU Ji-Zhao<sup>1</sup>, ZENG Xie-Rong<sup>2,3</sup>, XIONG Xin-Bo<sup>2,3</sup>, XIE Sheng-Hui<sup>2,3</sup>, TANG Han-Ling<sup>1</sup>, LI Long<sup>1</sup>

1. School of Materials Science and Engineering, Northwestern Polytechnical University, Xi'an 710072, China; 2. College of Materials Science and Engineering, Shenzhen University, Shenzhen 518060, China; 3. Shenzhen Key Laboratory of Special Functional Materials, Shenzhen 518060, China

**Abstract** The infiltration of carbon fiber preforms was studied by microwave pyrolysis chemical vapor infiltration technique, CH<sub>4</sub> as the carbon source gas, and N<sub>2</sub> as diluent gas, at 1100℃ and methane partial pressure of 10kPa with residence time of 0.05, 0.1, 0.15 and 0.2s, respectively. The textures of samples were observed, the densification rules of microwave pyrolysis CVI were analyzed by densification rate and radial-direction density distribution with different residence time. Results show that carbon fiber preforms can be densified from inside to outside at 1100℃ for 90h, with gas residence time of 0.15s, the carbon/carbon composite has a higher bulk density of 1.70g·cm<sup>-3</sup>. Simultaneously, polariscope images show that the textures of the pyrocarbon change from low-textured to medium-textured with the extending of residence time.

**Key words** [carbon/carbon composites](#) [microwave pyrolysis CVI](#) [residence time](#) [densification](#)

DOI:

通讯作者 曾燮榕 [zengxier@szu.edu.cn](mailto:zengxier@szu.edu.cn)

扩展功能

### 本文信息

▶ [Supporting info](#)

▶ [PDF\(546KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [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“炭/炭复合材料”的相关文章](#)

▶ [本文作者相关文章](#)

· [邹继兆](#)

· [曾燮榕](#)

· [熊信柏](#)

· [谢盛辉](#)

· [唐汉玲](#)

· [李 龙](#)