

研究报告

# 空气中电子束辐照对聚碳硅烷先驱丝化学结构与热解特性的影响

黎阳<sup>1, 2, 3</sup>; 许云书<sup>1, \*</sup>

1. 中国工程物理研究院 核物理与化学研究所, 四川 绵阳 621900

2. 贵州师范大学 材料与建筑工程学院, 贵州 贵阳 550014

3. 西南科技大学 材料科学与工程学院, 四川 621010

收稿日期 2007-12-18 修回日期 2008-7-11 网络版发布日期: 2009-8-30

**摘要** 采用10 MeV电子加速器产生的电子束在空气中辐照聚碳硅烷(PCS)先驱丝, 研究了吸收剂量对先驱丝的化学结构、凝胶含量、热解特性及烧成SiC纤维抗拉强度的影响。结果表明, 在电子束作用下, 辐照产物形成了Si—C—Si, Si—O—Si等桥联结构; 辐照产物的凝胶含量与陶瓷产率及烧成SiC纤维的抗拉强度都随吸收剂量的增加而增加, 先驱丝在吸收剂量为4.0 MGy时, 开始产生凝胶, 吸收剂量为7.0 MGy和10.0 MGy时, 其凝胶含量分别达81%和85%, 陶瓷产率分别达80.5%和83.8%, 所烧成的SiC纤维抗拉强度分别达1.7 GPa和1.9 GPa。

**关键词** [电子束](#); [辐照](#); [聚碳硅烷先驱丝](#); [SiC纤维](#)

**分类号** [0631.34](#)

## Effect of Electron Beam Irradiation in Air on Chemical Structure and Pyrolysis Properties of Polycarbosilane Precursor Fibers

LI Yang<sup>1, 2, 3</sup>; XU Yun-shu<sup>1, \*</sup>

1. Institute of Nuclear Physics and Chemistry, China Academy of Engineering Physics, Mianyang 621900, China;

2. School of Material and Architecture Engineering, Gui Zhou Normal University, Guiyang 550014, China; 3. School of Materials Science and Engineering, Southwest University of Science and Technology, Mianyang 621010, China

**Abstract** Polycarbosilane(PCS) precursor fibers were irradiated by 10 MeV electron beam in air atmosphere. Chemical structure, gel content, pyrolysis properties, and tensile strength were studied. Results show that bridge structures of Si—O—Si, Si—C—Si are formed in the irradiated products. Gel content, ceramic yield, and tensile strength are increased with the absorbed dose increasing. The fibers begin to form gel at a dose of 4.0 MGy. At the absorbed dose of 7.0 and 10.0 MGy, the gel content are 81% and 85%. The ceramic yield are 80.5% and 83.8%. The tensile strength are 1.7 GPa and 1.9 GPa, respectively.

**Key words** [electron beam](#); [irradiation](#); [polycarbosilane precursor fibers](#); [SiC fibers](#)

DOI

通讯作者 许云书<sup>1, \*</sup>

### 扩展功能

#### 本文信息

▶ [Supporting info](#)

▶ [\[PDF全文\]\(146KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

#### 服务与反馈

▶ [把本文推荐给朋友](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

#### 相关信息

▶ [本刊中包含“电子束; 辐照; 聚碳硅烷先驱丝; SiC纤维”的相关文章](#)

▶ [本文作者相关文章](#)

· [黎阳](#)

· [许云书](#)