

研究论文

前驱体分子结构对聚糠醇基碳膜微结构及气体分离性能的影响

王秀月, 王同华, 宋成文, 曲新春

大连理工大学化工学院精细化工国家重点实验室, 碳素材料研究室, 大连 116012

收稿日期 2006-9-5 修回日期 网络版发布日期 2007-6-6 接受日期

**摘要** 分别以草酸(OA)和碘(I)两种催化剂合成聚糠醇(PFA)前驱体制备气体分离碳膜. 采用TG, FTIR和XRD对其微结构进行研究, 并通过纯组分气体的渗透实验对碳膜的分离性能进行了探讨. 研究表明, 在热解过程中, 两种结构的聚糠醇都是通过脱氧、重排、环化、芳构化等热分解和热缩聚反应逐渐转化为无定形的乱层碳结构, 但热分解反应过程明显不同, 所形成碳膜微结构的差异也很大. 草酸催化剂制备的聚糠醇碳膜的微晶 $L_c$ 值比碘催化剂制备碳膜的大, 而 $d(002)$ 和 $L_a$ 值则比后者的小, 表明草酸催化剂制备的聚糠醇碳膜微晶片层数多、排列规则、结构缺陷和孔隙均小于碘催化剂制备的聚糠醇碳膜, 而且其气体分离选择性较高、渗透通量较小, 表明聚糠醇的分子结构对所制备碳膜的微结构及气体分离性能有很大影响.

**关键词** [聚糠醇](#) [碳膜](#) [分子结构](#) [气体分离](#)

**分类号** [0643](#) [0626.11](#) [T028.8](#)

Influence of Molecular Structure of Precursors on Microstructure and Gas Separation Performance of Carbon Membranes Derived from Poly(furfuryl alcohol)

WANG Xiu-Yue, WANG Tong-Hua\*, SONG Cheng-Wen, QU Xin-Chun

Carbon Material Research Lab., State Key Lab of Fine Chemicals, College of Chemical Engineering, Dalian University of Technology, Dalian 116012, China

**Abstract** Poly(furfuryl alcohol)(PFA) synthesized over different catalysts(oxalic acid and iodine) was used to prepare tubular C/CMS composite membranes. TG, FTIR and XRD were employed to characterize microstructure change of carbon membranes during the pyrolysis. Gas separation performance of the carbon membranes was also investigated by molecular probe with pure gases. The results show that the original chemical structure of the two PFA are transformed to turbostratic carbon structure from cross-linking polymeric structure by a series of reactions such as cyclization and aromatization during the pyrolysis. Although they followed similar pyrolysis behavior, the chemical reaction during the pyrolysis and the resultant microstructure of carbon membranes are different. In addition,  $d(002)$  and  $L_a$  of the carbon membranes polymerized over oxalic acid are smaller while  $L_c$  is larger than those polymerized over iodine. This indicates that the microstructure of carbon membranes polymerized over oxalic acid are more ordered and less defected than those polymerized over iodine. Carbon membranes polymerized over oxalic acid show a higher permselectivity and lower permeability.

**Key words** [Poly\(furfuryl alcohol\)](#) [Carbon membrane](#) [Molecular structure](#) [Gas separation](#)

DOI:

扩展功能

本文信息

[Supporting info](#)

[PDF\(344KB\)](#)

[\[HTML全文\]\(0KB\)](#)

[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“聚糠醇”的 相关文章](#)

[本文作者相关文章](#)

[王秀月](#)

[王同华](#)

[宋成文](#)

[曲新春](#)