

研究论文

碱处理PVDF膜对制备高电导率质子交换膜的作用

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摘要 燃料电池是一种高能量密度、低污染的新型能源. 质子交换膜是燃料电池的核心组件之一.

在对聚偏氟乙烯(PVDF)膜进行了碱处理改性的基础上制备了高电导率的聚偏氟乙烯接枝聚苯乙烯磺酸(PVDF-g-PSSA)质子交换膜, 对碱处理后的PVDF膜进行了傅立叶变换红外光谱(FTIR)、傅立叶变换拉曼光谱(FT-Raman)及电子自旋共振(ESR)分析. 振动光谱显示在处理后的膜中存在共轭碳碳双键.

首次用ESR检测到碱处理后的PVDF膜中形成了自由基, 其浓度在 $10^{16}$  spin/g.

研究表明碱处理引起的膜结构变化有利于接枝反应的进行, 对提高所合成的质子交换膜的电导率有重要作用, 电导率提高一个数量级, 至 $6.40 \times 10^{-2}$  S/cm.

关键词 [聚偏氟乙烯](#) [碱处理](#) [自由基](#) [接枝](#) [电导率](#)

分类号

**Effect of Alkaline Treatment of PVDF Membranes on Preparation of Proton Exchange Membranes with High Conductivity**

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**Abstract** Fuel Cell is a new type of power source with high power density and little pollution. Proton exchange membrane is a key component of the fuel cell. Poly(vinylidene fluoride) grafted polystyrene sulfonated acid (PVDF-g-PSSA), a kind of proton exchange membrane, with high proton conductivity has been prepared by solution grafting on alkaline treated poly(vinylidene fluoride) membrane. PVDF membranes treated with alkaline solutions were studied by FTIR, FT-Raman spectroscopy and electron spin resonance (ESR). The vibrational spectra showed the existence of conjugated C=C bonds in the treated membranes. Free radicals were observed in the membranes from the ESR spectra, the concentrations of which were in the  $10^{16}$  spin/g order of magnitude. The structure modification of the alkaline treated PVDF membrane could improve the grafting on the membrane and played an important role in increasing the conductivity of PVDF-g-PSSA membrane to a high value of  $6.40 \times 10^{-2}$  S/cm.

**Key words** [PVDF](#) [alkaline treatment](#) [free radical](#) [graft](#) [conductivity](#)

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