

论文

新型萘酐型磺化聚酰亚胺质子交换膜的合成

尚玉明¹; 谢晓峰¹; 刘洋¹; 徐景明¹; 毛宗强¹; 周其凤²

1. 清华大学核能与新能源技术研究院, 北京 100084;
2. 教育部高分子化学与物理重点实验室, 北京大学化学与分子工程学院, 北京 100871

摘要:

以新型磺化二胺单体, 1,4-双(4-氨基-2-磺酸基苯氧基)苯(DS-TBDA)与非磺化单体1,4'-二氨基二苯醚(ODA)、1,4,5,8-萘四酸二酐(NTDA)为原料, 采用高温聚合法, 制备了一系列具有不同磺化度的萘酐型磺化聚酰亚胺(S-PI)质子交换膜材料, 并研究了材料性能与结构的关系. 磺化度超过33%时, 质子传导率可达到与Nafion膜同一数量级的水平, 而甲醇透过率均在 $2.85 \times 10^{-7} \text{ cm}^2/\text{s}$ 以下, 比Nafion膜低1-2个数量级. 研究结果表明, 该膜有望在直接甲醇燃料电池(DMFC)中获得应用.

关键词: 磺化聚酰亚胺 磺化二胺 质子交换膜 直接甲醇燃料电池

Preparation of Novel Naphthalenic Sulfonated Polyimide Proton Conductive Membrane

SHANG Yu-Ming¹; XIE Xiao-Feng^{1*}; LIU Yang¹; XU Jing-Ming¹; MAO Zong-Qiang¹; ZHOU Qi-Feng²

1. Institute of Nuclear and New Energy Technology, Tsinghua University, Beijing 100084, China;
2. Key Laboratory of Polymer Chemistry and Physics of Ministry of Education, College of Chemistry & Molecular Engineering, Peking University, Beijing 100871, China

Abstract:

To prepare proton conductive membrane for DMFC, a novel sulfonated diamine 1,4-bis(4-amino-2-sulfonic-phenoxy)-benzene(DS-TBDA) was synthesized and polymerized with a non-sulfonated diamine (ODA) and naphthalene-1,4,5,8-tetracarboxylic dianhydride(NTDA) to get a series of naphthalenic sulfonated polyimides(S-PI). The sulfonation degree of the polymers was controlled by changing the molar ratio of the monomers. The obtained SPI membrane was characterized by FTIR and the properties, such as water uptake, proton conductivity and methanol permeability, were investigated. With the increase of sulfonation degree, the proton conductivity and methanol permeability raise gradually. The proton conductivities of the SPI membranes are in a range of from 0.007 9 to 0.072 S/cm and the methanol permeability is less than $2.85 \times 10^{-7} \text{ cm}^2/\text{s}$. The experiment result indicats they are great potential candidates for fuel cell applications.

Keywords: Sulfonated polyimides Sulfonated diamine Proton conductive membrane DMFC

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