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论文

PAMPSLi/P(MMA-VAc)为基体的聚合物电解质

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摘要:

将聚(2-丙烯酰胺-2-甲基丙磺酸锂)(PAMPSLi)和聚(甲基丙烯酸甲酯-醋酸乙烯酯)[P(MMA-VAc)]与$LiClO_4$共混, 制备了复合聚合物电解质膜. 用FTIR, TG, XRD, DMA, SEM及电化学交流阻抗和机械性能测试对聚合物及其电解质膜的结构和性能进行了表征. 结果表明, PAMPSLi与P(MMA-VAc)共混后结晶状态发生变化, 交联网络变得密实, 提高了热稳定性和拉伸强度, 聚合物电解质膜含有较多微孔结构, 孔径为5~10 μm; 在20 ℃时, 当n(MMA)∶n(VAc)=2∶8, m(PAMPSLi)∶m[P(MMA-VAc)]=5∶95, m($LiClO_4$)∶m(copolymer)=15∶85时, 聚合物电解质膜电导率可达到1.68×10^{-3} S/cm, 且电导率未出现随$LiClO_4$含量的进一步增加而下降的现象. 将此电解质用于全固态电致变色显示器件表现出了优良的性能. 对加入PAMPSLi后聚合物电解质膜电导率和热稳定性提高的原因进行了初步探讨.

关键词: 聚合物电解质; 聚(甲基丙烯酸甲酯-醋酸乙烯酯); 聚(2-丙烯酰胺-2-甲基丙磺酸); 离子电导率; 电致变色器件

Polymer Electrolytes Based on PAMPSLi/P(MMA-VAc)

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Abstract:

Poly-2-acrylamido-2-methylpropanesulfonic acid lithium(PAMPSLi) and poly-vinylacetate-methyl methacrylate[P(MMA-VAc)] were synthesized. And the polymer electrolytes were prepared by blending PAMPSLi, P(MMA-VAc) and LiClO4. Performances of the copolymer and polymer electrolyte were studied by FTIR, TG, XRD, DMA, SEM, alternating current(AC) impedance andmechanical testing. The results showed that: the crystallization state of the polymer electrolyte changed after blending PAMPSLi with P(MMA-VAc); the cross-linked network changed dense; the thermal stability and tensile strength were improved; the polymer electrolyte membrane had a great number of micro-pores with dimension of 5—10 μm; the ionic conductivity value of the copolymer membrane reached 1.68×10^{-3} S/cm when n(MMA)∶n(VAc)=2∶8, m(PAMPSLi)∶m[P(MMA-VAc)]=5∶95 and m($LiClO_4$)∶m(copolymer)=15∶85 at 20 ℃, which did not appear drop by the increase of the $LiClO_4$. And its excellent performance promised the usage of the polymer electrolytes as the ionic conductor material in electrochromic devices(ECD). The mechanism of the conductivity and the thermal stability of polymer electrolyte membrane with the increase of PAMPS was preliminary studied.

Keywords: Polymer electrolyte; Poly-2-acrylamido-2-methylpropanesulfonic[P(MMA-VAc)]; Poly-vinylacetate-methyl methacrylate acid(PAMPS); Ionic conductivity; Electrochromic device

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