

论文

热致相分离法制聚偏氟乙烯微孔膜稀释剂的选择

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摘要:

依据聚偏氟乙烯(PVDF)、邻苯二甲酸二甲酯、水杨酸甲酯、卡必醇醋酸酯、三醋酸甘油酯、邻苯二甲酸二正丁酯(DBP)、苯乙酮和二苯甲酮(DPK)的Hansen溶度参数及其相对介电常数, 选择能与PVDF以液-液相分离机理进行热致分相的稀释剂, 制备了具有双连续结构的微孔膜. 通过比较PVDF-稀释剂间的溶度参数及相对介电常数的差异, 发现PVDF-DBP体系和PVDF-DPK体系有发生热致液-液相分离的可能. 实时观察上述两个体系的分相过程并测定其结晶温度, 当PVDF质量分数低于30%时, 随着温度的降低, PVDF-DPK体系发生液-液相分离. 根据PVDF-DPK体系相图, 通过控制PVDF含量和降温条件, 无须添加非溶剂或拉伸工艺, 就可以制备出具有双连续结构的PVDF微孔膜.

关键词: 聚偏氟乙烯 Hausen溶度参数 相对介电常数 热致相分离 微孔膜

Diluent Selection of PVDF Membrane Prepared *via* Thermally Induced Phase Separation

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Abstract:

For the preparation of polyvinylidene fluoride(PVDF) membrane with bicontinuous structure *via* thermally induced phase separation(TIPS), the Hansen soluble parameters and permittivity were utilized for the selection of suitable diuent from dimethyl phthalate, methyl salicylate, carbitol acetate, glyceryl triacetate, dibutyl phthalate, acetophenone and diphenyl ketone. The interaction parameters estimated by Hansen soluble parameters and the difference of permittivity of PVDF-diluents show that liquid-liquid phase separation might occur in PVDF-DBP and PVDF-DPK systems. The measured PVDF crystallization temperature and the observed phase separation process indicate the occurrence of liquid-liquid phase separation in PVDF-DPK system when PVDF mass fraction was less than 30%. According to the phase diagram of PVDF-DPK, the PVDF microporous membranes with bicontinuous structure was prepared by controlling PVDF concentration and temperature without adding non-solvent or stretching process.

Keywords: Polyvinylidene fluoride(PVDF) Hausen soluble parameter Relative dielectric contant Thermally induced phase separation Micropore membrane

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