

化学与环境

基于RAFT聚合的蜂窝状有序多孔膜的制备及表征

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摘要: 以苯乙烯为单体, S, S'-( $\alpha$ ,  $\alpha'$ -二甲基- $\alpha''$ -乙酸)三硫代碳酸酯(BDAAT)为链转移剂, 偶氮二异丁腈(AIBN)为引发剂, 进行苯乙烯(St)的可逆加成—断裂链转移(RAFT)自由基聚合, 同时以传统的自由基本体聚合方法制备聚苯乙烯(PS)。然后以两种方法制备的PS和聚乙二醇(PEG)为成膜物质, 通过水滴模板法在高湿氮气下制备了微观多孔膜。探讨了聚苯乙烯多孔膜的形成机理, 研究了聚合方式、聚合物溶液质量分数及溶剂的挥发性等对微观多孔膜结构的影响。研究表明, 多孔薄膜的形貌受线性聚合物的末端基团以及亲水性物质等综合因素的影响, 膜孔径随聚合物溶液质量分数的增大而减小。

关键词: RAFT 微孔膜 聚苯乙烯 水滴模板法

Preparation and characterization of honeycomb microporous films based on reversible addition fragmentation chain transfer (RAFT) polymerization

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Abstract: The polystyrene (PS) was synthesized via reversible addition fragmentation chain transfer (RAFT) radical polymerization using azo bis isobutyronitrile (AIBN) as the initiator, (S, S')-bis( $\alpha$ ,  $\alpha'$ -dimethyl- $\alpha''$ -acetic acid) (trithiocarbonate) (BDAAT) as the chain transfer agent (CTA). In addition, the polystyrene (PS) was synthesized by traditional radical bulk polymerization. Under the high humidity and nitrogen conditions, the microporous films were prepared by water drop templated method using polystyrene (PS) and polyethylene glycol (PEG) as materials of the membranes respectively. The mechanism of the formation of PS honeycomb microporous films was discussed. Moreover, the influence of the polymerization manner, the solution concentration, and the volatility of solvents on the structure of the microporous films were also studied. The results showed that the morphology of microporous films was affected by the end group of linear polymer, hydrophilic matter and so on. The diameter of film pore decreased obviously with the increasing of the polymer concentration.

Keywords: RAFT microporous films PS water drop templated method

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