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论文

提高MMA-6FBA梯度折射率系统折射率差值的研究

郭远超,易佑民,李欢欢,常锋,朱国荣

安徽大学物理与材料科学学院

摘要：

系统地研究了提高含氟高分子梯度折射率系统：甲基丙烯酸甲酯(MMA)-丙烯酸六氟丁酯(6FBA)共聚材料折射率差值的问题。首先，对不同摩尔比值的两单体混合液，选择适合的工艺条件(共聚温度60℃-70℃，引发剂过氧化苯甲酰0.1wt%-0.2wt%)进行本体共聚反应，获得各摩尔比值下的匀质聚合物；并用最小偏向角法分别测量了由系列匀质聚合物制作的三棱镜的折射率。结果表明：该体系可在MMA与6FBA两单体广泛的质量配比下进行共聚，形成透光性能很好的光学材料；匀质聚合物的折射率与生成该聚合物的单体摩尔比值呈准线性关系。结果表明，如采用多层、不同摩尔比值的薄层进行凝胶扩散共聚反应，有望获得折射率差值高达0.06-0.07左右的梯度折射率材料，比现有梯度折射率器件的折射率差值提高近一个数量级，对于提高梯度折射率光学器件的光学性能具有积极的意义。试验还附带研究了各摩尔比值匀质聚合物的色散性能，在可见光区分别测得各试样在汞灯黄、绿、紫谱线处的不同折射率值，计算了相应科希色散公式的系数。

关键词： 梯度折射率 共聚反应 最小偏向角法 色散曲线 GRIN copolymerization the method of minimum deviation angle dispersion curve

Research on Improving Refractive Index Difference of MMA -6FBA Gradient Refractive Index System

Abstract:

To improve fluoropolymer GRIN(gradient refractive index) system of refractive index difference of copolymerization material of Methyl methacrylate and Hexafluorobutyl acrylate(MMA-6FBA) has been systematically studied.First, for the different molar ratio of two monomers mixtures，the different molar ratio of homogeneous polymer is obtained by choosing the proper condition(the reaction temperature is 60℃-70℃, initiator benzoyl peroxide（BPO）is 0.1wt%- 0.2wt%)from carrying out bulk copolymerization and its refractive index has been measured respectively by the method of minimum deviation angle. The experimental results demonstrate that MMA-6FBA system is carried out copolymerization at a wide mass ratio of two monomers and formed optical materials of high transparent property;Its refractive index is a prelinear relation with molar ratio of homogeneous polymer changed; For example, the use of multilayer different molar ratio of thin layer is carried out gel diffusion copolymerization,it will be hopeful to get refractive index difference of GRIN material reached 0.06-0.07,improve one order of magnitude than that of the existing GRIN material component and has positive significance for improving optical properties of GRIN optical devices.Dispersion characteristics of the different molar ratio of homogeneous polymer is studied in passing。Various index of every sample is measured respectively to yellow line, green line and purple line of mercury lamps in the visible light region and the coefficients of the relevant cauchy dispersive empirical formula is calculated。

Keywords:

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通讯作者: 易佑民

作者简介:

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