

论文

聚硅氧烷微球/PMMA光散射材料的制备与光学性能

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摘要:

采用共混法以聚硅氧烷微球作为光散射剂,聚甲基丙烯酸甲酯为基材制备光散射材料.研究了聚硅氧烷微球的粒径与浓度对光散射材料总光透过率与扩散率的影响并与理论模拟值进行了对比分析.研究表明,聚硅氧烷微球与聚甲基丙烯酸甲酯折射率匹配良好,较好地解决了光散射材料透过率与扩散率之间的矛盾,实现了高透射与高雾度的双重要求.当微球粒径为5 μm ,填充浓度为0.6 wt%时,厚度为1 mm的光散射材料总光透过率为88.5%,扩散率为89.5%.可见光波段总光透过率基本不受光源波长变化影响.选取合适粒径,扩散率随光源波长变化也可降至最低,有效避免了波长色散现象.实验数据与理论模拟结果符合良好.

关键词: 光散射材料 总光透过率 扩散率 聚硅氧烷微球

Preparation and Optical Properties of Polysiloxane Microspheres/PMMA Light Scattering Materials

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Abstract:

Light scattering materials with polysiloxane microspheres as the light scattering agents and poly(methyl methacrylate) as the matrix were prepared by mixed method. The influence of concentration and the particle diameter of light scattering agents on the total transmittance and diffusivity were studied and compared with the theoretical values. The results show that: the refractive indexes of polysiloxane microspheres and Poly(methyl methacrylate) are well matched, the contradiction between light transmittance and diffusivity can be solved, and the double requirements of high transmittance and haze can be achieved. When the mean diameter of microspheres is 5 μm , doping concentration is 0.6wt%, total light transmittance of light scattering materials with the thickness of 1 mm is 88.5%, and diffusivity is 89.5%. Furthermore, in the visible light wavelength, total transmittance is almost independent from wavelength. The change of diffusivity with the wavelength of light source can also be minimized with appropriate particle diameter, and wavelength dispersive can be avoided effectively. The experimental data and theoretical simulation results are very consistent.

Keywords: Light scattering materials Total transmittance Diffusivity Polysiloxane microspheres

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