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Surface Hydrophobic Modification of Polymers with Fluorodiazomethanes

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ABSTRACT: Two fluorinated diazomethanes were synthesized, and used for the modification of polystyrene XAD4, polyacrylate MAC-3, filter paper, and HybondTM membrane. The structure of modified polymers was confirmed by XPS and solid-state NMR spectra, with a surface loading of $8.28 \times 10^{12} \sim 1.68 \times 10^{13}$ molecules per cm^2 . Water contact angle values, which increased from 0° to 128.51° (for filter paper) and 120.02° (for HybondTM membrane), demonstrated hydrophobicity.

KEYWORDS: diaryldiazomethane; fluoroalkyl; surface modification; hydrophobic ; post-polymerisation

Introduction

The hydrophobic behavior of solid surfaces has a wide diversity of applications such as self-cleaning surfaces, high adhesive surfaces, antifogging coatings, and antireflection coatings¹. Different preparation strategies have been developed to fabricate hydrophobic surfaces²⁻³, which include nanoparticles doping⁴⁻⁶, the introduction of fluoric or silicic or long alkyl chain chemistry⁷⁻¹⁰, and plasma treatment¹¹⁻¹². He et al.¹³⁻¹⁴ used CF_4 plasma modification for the conversion of a hydrophilic membrane into a hydrophobic membrane but a simple, universal and efficient chemical method for the direct hydrophobic modification of a wide range of polymers would be highly desirable. Modification have been developed¹⁵ using carbenes¹⁶ or nitrenes¹⁷, and we have developed a strategy of modification through carbene insertion reactions

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