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Synthesis and Characterization of Partially Bio-Based Polyimides Based on Biphenylene-Containing Diisocyanate Derived from Vanillic Acid

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Abstract

A new bio-based biphenylene-containing diisocyanate, namely, 5,5'-diisocyanato-2,2',3,3'-tetramethoxy-1,1'-biphenyl (BDI) was synthesized starting from vanillic acid – a lignin-derived phenolic acid. A series of new partially bio-based polyimides was prepared by polycondensation of BDI with five commercially available aromatic dianhydrides. Polyimides exhibited good solubility in organic solvents and medium molecular weights (M_n (GPC, polystyrene standard) = 25,100-32,200 g mol⁻¹). Polyimides showed good thermal stability with 10 % degradation temperature and glass transition temperature in the range 459-473 °C and 262-329 °C, respectively.

1. Introduction

Aromatic polyimides represent an important class of high performance polymers due to their excellent thermal, mechanical and chemical resistance properties. Polyimides often replace glass and metals and are mainly used in industrial sectors such as automotive, aerospace, gas separation, electronic packaging, adhesives, etc [1–4].

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