

A novel semi-alicyclic dianhydride starting from camphor and the optical property of the polyimide films.

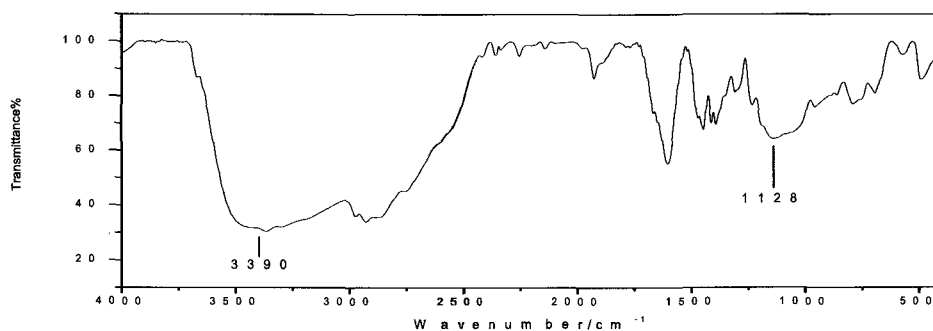
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Although aromatic polyimides have excellent thermal stability and mechanical properties, most of them are insoluble in organic solvents and strongly absorb visible light, and have relatively higher dielectric constant ϵ over 3.0[1]. Alicyclic polyimides, which diminish the intra-molecular charge-transfer and visible light absorbance by the less aromatic polymer backbone, have attracted much attention in recent years because of their potential applications including use as liquid crystal orientation layers, light-guide and high-temperature low dielectric materials[2,3].

This paper presents the synthesis of a semi-alicyclic dianhydride (CEDA) starting from the renewable forestry chemical camphor, which was oxidized to diacid, and then reduced to diol, followed by esterification to offer the target compound. The synthetic route is shown in Scheme 1.



Scheme 1. The synthesis of semi-alicyclic dianhydride starting from natural camphor

The target compound was characterized by IR and ^1H NMR, as shown in Fig.1 and Fig.2, which confirmed the synthesis of semi-alicyclic dianhydride.

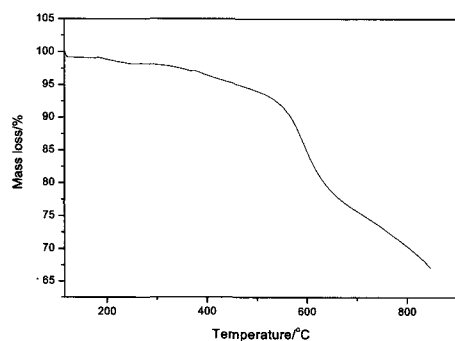


Fig.1. IR spectrum of CEDA

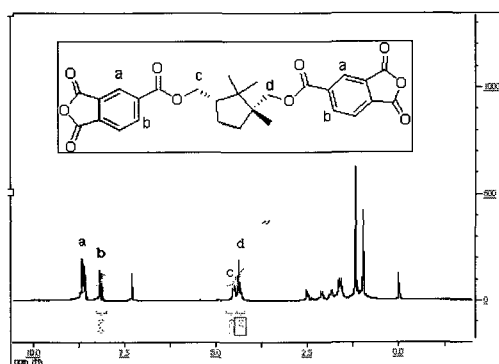


Fig.2. ^1H NMR spectrum of CEDA

The transmission UV-vis tests were conducted of free-standing polyimide films prepared from CEDA and DMB, CEDA and ODA, PMDA and DMB, PMDA and ODA, respectively, and the results are summarized in Fig.3. Semi-alicyclic polyimides exhibit cutoffs at 380nm and 365nm, showing little

absorbance of visible light, whereas, aromatic polyimides exhibit strong absorbance within visible spectra, whose cutoffs lie in 493nm and 447nm. It indicates that the introduction of alicyclic moiety helps improve the optical transparency of polyimides.

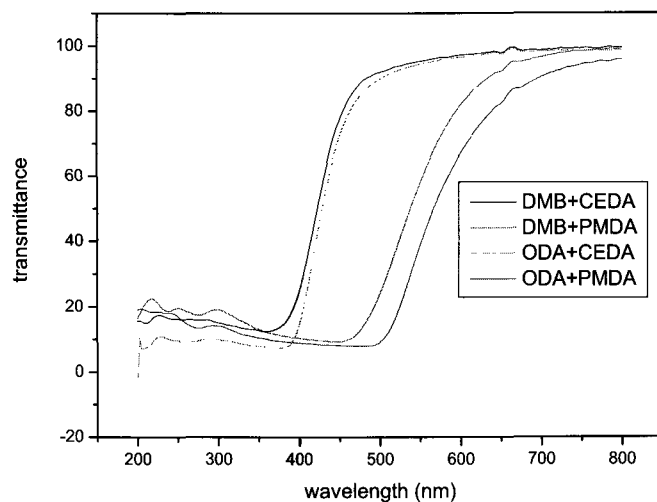


Fig.3. UV-vis spectra for free-standing films of semi-alicyclic and aromatic polyimides

Acknowledgements

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(continuing from p129)

The decrease of the decomposition temperature of PEEK main chain may originate from the catalytic degradation of the polymer chain caused by nitril groups.

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