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Transparent and soluble polyimide films from 1,4:3,6-dianhydro-D-mannitol based dianhydride and diamines containing aromatic and semiaromatic units: Preparation, characterization, thermal and mechanical properties

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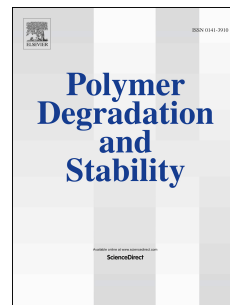
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15 **Abstract**

16 To develop colorless and soluble polyimide films, a novel dianhydride containing
17 1,4:3,6-dianhydro-D-mannitol unit, 2,5-bis(3,4-dicarboxyphenoxy)-1,4:3,6-
18 dianhydromannitol dianhydride (IMDA) was synthesized. And two series of
19 polyimides were prepared *via* a two-step thermal imidization, PI-(1-4) were obtained
20 from IMDA and four kinds of aromatic diamines while PI-(5-7) from IMDA and
21 three kinds of semiaromatic diamines. All the polyimides were readily soluble in
22 common polar solvents and could afford flexible, tough and colorless films with
23 transparency up to 89% at 450 nm. Especially, polyimides simultaneously containing
24 1,4:3,6-dianhydrohexitol units in diamine and dianhydride exhibited comparable
25 optical and soluble performance with the alicyclic fluorinated ones. Meanwhile, it was
26 certified that 1,4:3,6-dianhydrohexitol fragment in dianhydride was more determinant
27 in solubility and transmittance of polyimides than that in diamine. An overall
28 investigation of these polyimides on thermal, mechanical, morphological, soluble,
29 optical and dielectric properties was presented, and their structure-property
30 relationships were discussed in detail.

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