

Synthesis and Characterization of Some New Diamines and Their Thermally Stable Polyimides

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Abstract : This paper comprises of synthesis of thermally stable, mechanically strong polyimides. The polyimides were considered as most diverse class of polymers having unlimited applications. They were widely used as optical wave guides, in aerospace, for gas separation, as biomaterials and in electronics. Here the focus was to increase thermal stability and mechanical strength of polyimides. For this purpose two monomers were synthesized and were further polymerized via anhydrides to polyimides. The monomer diamines were synthesized by nucleophilic attack of aniline/2-fluoro aniline on hydroxy benzaldehydes. The two diamines synthesized were 3-(bis(4-aminophenyl) methyl) phenol (3OHDA) and 4-(bis(4-amino-3-fluorophenyl) methyl) phenol (2F4OHDA). These diamines were then reacted with dianhydrides to get polyimides. Two neat polyimides of both diamines with pyromellitic dianhydride (PMDA) and one neat polyimide of 4'-(Hexafluoroisopropylidene) diphthalic dianhydride (6FDA) with 3OHDA were synthesized. To compare the properties of synthesized polyimides like thermal stability, rigidity, flexibility, toughness etc. a commercial diamine oxydianiline (ODA) was used. Polyimides from oxydianiline were basically rigid. Nine different polyimide blends were synthesized from 3OHDA and commercial diamines ODA to have a better comparison of properties. TGA and mechanical testing results showed that with the increase in the percentage of 3OHDA in comparison to ODA the flexibility, toughness, strength of polyimide, thermal stability goes on increasing. So, synthesized diamines were responsible for improvement of properties of polyimides.

Keywords : diamines, dianhydrides, oxydianiline, polyimides

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