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Synthesis and Characterization of Novel Polyimides from 2, 2′-dihydroxybenzophenone-3, 3′, 4, 4′-tetracarboxylic dianhydride

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Polyimides, particularly aromatic polyimides, were originally developed for applications as long-term structural materials due to their outstanding thermal, thermo-oxidative, and dimensional stability and high-energy radiation resistance. Polyimides can be divided into two classes, one is condensation-type polyimides and the other is addition-type ones which is more frequently called BMI.

We designed novel aromatic polyimides from 3, 3′, 4, 4′-benzophenonetetracarboxylic dianhydride containing hydroxyl groups. The novel monomeric dianhydride 2, 2′-dihydroxybenzophenone-3, 3′, 4, 4′-tetracarboxylic dianhydride (BDHAN) were synthesized by cyclodehydration of 2, 2′-dihydroxybenzophenone-3, 3′, 4, 4′-tetracarboxylic acid, respectively with 2, 2′-dimethoxybenzophenone-3, 3′, 4, 4′-tetracarboxylic acid followed by deprotecting of the methyl groups. The monomeric dianhydride was characterized by FT-IR, ^{1}H-NMR, ^{13}C-NMR spectroscopic methods and used to prepare polyimides with a number of diamines such as PDA, MDA, and ODA. Polyimides were characterized by FT-IR, TGA, DSC and inherent viscosity measurements. The properties of obtained polyimides such as solubility, phase transitions and structure were investigated by means of DSC, TGA, WAXS and SAXS.

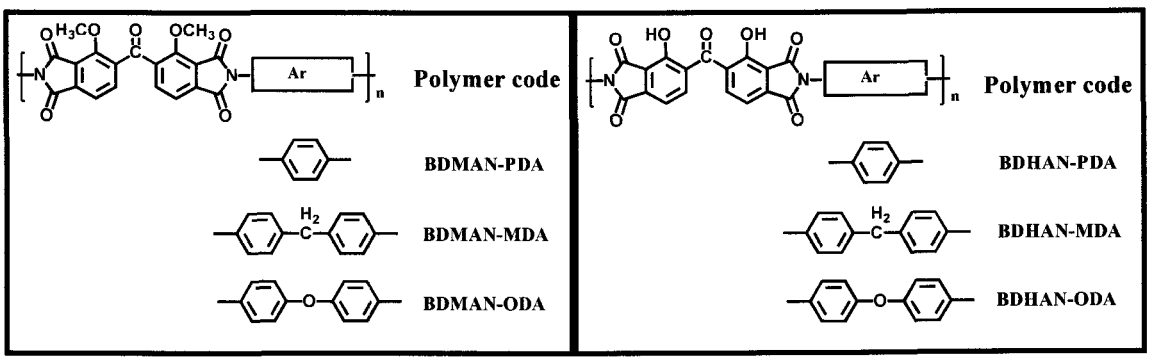

Figure 1. Molecular Structure of novel polyimides