

# Polyimides using hydrazine as the diamine

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## Abstract

A novel diamine monomer, 3,3'-Bis(N-aminophthalimide) (BAPI) which could produce five-member ring, hydrazine-based polyimides, was prepared from 3,3'-bis(N-phenylphthalimide) and hydrazine in moderate yield (70%). A series of homo- and co-polyimides were synthesized via conventional method in p-chlorophenol. Inherent viscosities of the polymers were in the range of 0.18-0.50 dl/g in DMAc at 30°C. Homo-polyimide films based on BPDA, BTDA, and ODPDA were brittle, while homo-polyimide films based on 6FDA, 3,3'-HQPDA, and 4,4'-HQPDA were transparent and flexible. Using 4,4'-diaminodiphenylether as the copolymerization monomer, transparent and flexible films were cast from the DMAc solutions of co-polyimides based on BPDA, BTDA, and ODPDA. Both homo- and co-polyimides showed good solubility in polar aprotic solvents and phenols at room temperature, what's more, polyimides based on 6FDA and 4,4'-HQPDA were soluble in chloroform and TCE. The temperatures of 5% weight loss ( $T_{5\%}$ ) of all polyimides ranged from 495 to 530 °C in air. The tensile strengths of homo- and co-polyimides at break, the modulus, and the elongations at break are in the range of 85-132 MPa, 1.77-2.77 GPa, and 5.0-10.3%, respectively. These polyimides possessed very high  $T_g$ s, which were in the range from 371 to 432 °C. The polyimides also have excellent optical transparent properties and light coloration.