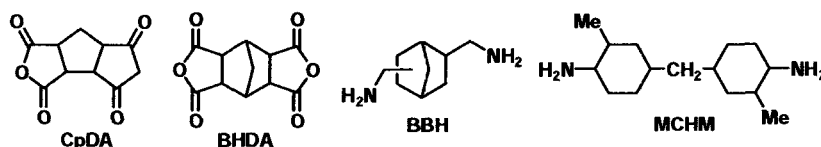


## Fully Alicyclic Polyimides

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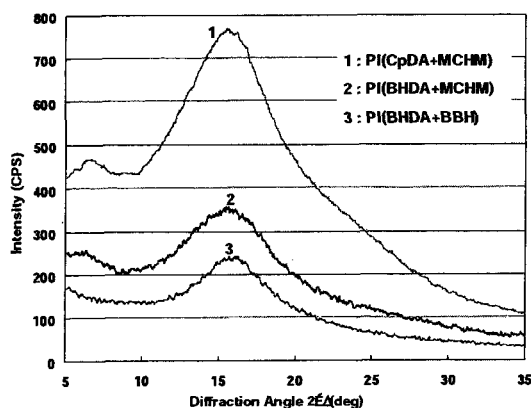
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Fully alicyclic polyimides were synthesized by the polycondensation of bicyclo[2.2.1]heptane-2,3,5,6-tetracarboxylic 2,3,5,6-dianhydride (BHDA) or cyclopentane-1,2,3,4-tetracarboxylic 1,2,3,4-dianhydride (CpDA) with alicyclic diamines such as BBH and MCHM. Chemical structures and abbreviations of the monomers were illustrated in **Fig. 1**.



**Fig. 1** Structure and abbreviation of monomers for fully alicyclic polyimides.

Although the poly(amic acid)s had inherent viscosities ( $\eta_{inh}$ ) in the range from 0.1 to 0.4, they formed free-standing and flexible films after being cast then cured. The fully alicyclic polyimide films were not soluble in common organic solvents. The films exhibited a cutoff around 230 nm, and were transparent even in the near IR region. Optically estimated dielectric constant  $\epsilon$ 's of the polyimides were



**Fig. 2** WAXD pattern of polyalicyclic polyimide

approximately 2.6 and the polyimides possessed negligibly small birefringence below  $10^{-4}$ . All the polyimide films exhibited broad dispersive peaks of diffraction around  $16^\circ(2\theta)$  and amorphous nature (**Fig. 2**). The PI(BHDA+BBH) film had a tensile modulus of 2.1 GPa and a tensile strength of 52 MPa, which are comparable to those of polycarbonate of bisphenol A.

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