IL-01

Synthesis of Soluble Polyimides from Unsymmetrical Diamines

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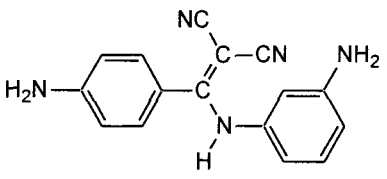
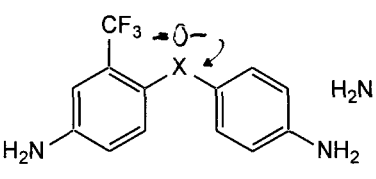
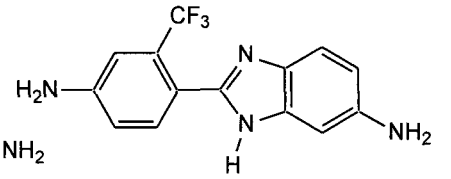
Thermally stable organic polymers have been a subject of continuing research in order to extend the application of organic materials in harsh conditions. Of thermally stable organic polymers, outstanding properties of aromatic polyimides such as excellent thermooxidative stability, high mechanical strength, excellent electrical properties as well as superior chemical resistance led to the use of polyimides in a variety of applications, such as insulating materials for electronic applications, polymer matrices for high temperature composites, semipermeable membranes for gas separation and high temperature adhesives and coatings. In general, rigid-rod like polymers are insoluble and intractable or only processable under extreme conditions due to strong enthalpic interactions and the minimal increase in conformational entropy associated with their dissolution and melting. A great deal of research efforts of polyimides have been concentrated on increasing processability with minimal effect on thermal stability as well as improvement of their specific properties, and several approaches to soluble polyimides including introduction of flexible linkage or bulky substituents and use of noncoplanar or alicyclic monomers have been developed. For example, the polyimides containing unsymmetrically structured aromatic ring with perfluoroalkoxy or phenyl groups showed enhanced solubility behavior. Most of these approaches for soluble polyimides are based on the reduction of chain-chain interactions such as chain packing (e.g. crystallinity) and charge transfer and electronic polarization interactions.

We have designed and synthesized the diamines with unsymmetrical structures that enhance the solubility of rigid polyimides, and several soluble polyimides were successfully prepared from the diamines monomers. Detailed synthetic procedure for the diamines and properties of the polyimides made from these diamines will be discussed.







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