Synthesis and Properties of Fluorine-Containing Aromatic Polyimides Having Perfluorooctyl Group

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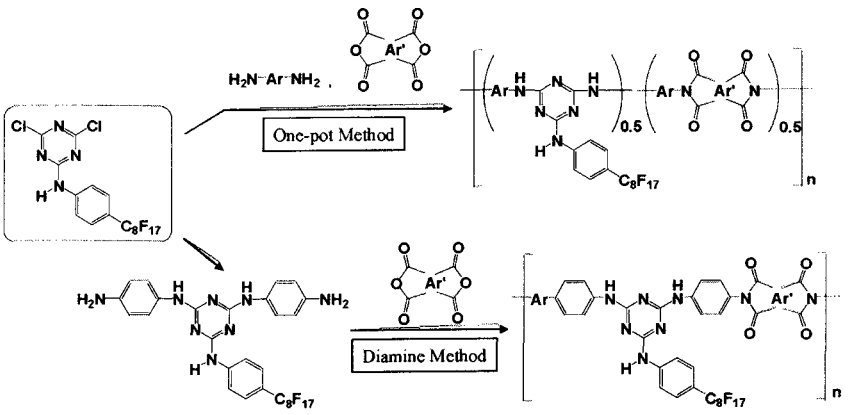
Fluoropolymers have proven to be a very interesting and useful polymeric materials due to their unique properties such as low surface energy, low refractive index, low dielectric constant, high thermal stability, and chemical resistance. It is of particular interest to incorporate these properties into aromatic polyimides. Introduction of perfluroalkyl or perfluoroalkenyl [1] pendants along the polyimides is an interesting way of incorporating a high level of fluorine atom into the polyimides. In this study, the triazine-containing monomers with perfluoroalkyl group were employed for the synthesis of perfluoroalkylated polyimides. The novel fluorine-containing aromatic polyimides could be successfully synthesized through diamine method by the polymerization of triazine-containing diamine with perfluorooctyl group and tetracarboxylic dianhydrides, or one-pot method by the polymerization of triazinedichloride with perfluorooctyl group, diamines, and tetracarboxylic dianhydrides (Scheme 1).



Scheme 1. Synthesis of polyimide

The diamine method was the conventional procedure for the synthesis of the polyimides. The one-pot method was convenient procedure for the synthesis of the polyimides. Some of the polyimides were soluble in *N*-methyl-2-pyrrolidone, 1,3-dimethyl-2-imidazolidone, and *N,N*-dimethylformamide. The glass transition and 5% weight loss temperatures of polyimides were 250-290°C and 405-430°C, respectively. The films of polyimides had tensile strength of 50-80 MPa, elongation at break of 2-25%, and tensile modulus of 1.6-3.3 GPa. The contact angles of water on the polyimide films were in the range of 95-100°.

Reference

[1] Y.Oishi, N. Yoshida and K. Mori, *J. Photopolym. Sci. Technol.*, **18**, 341-344 (2005).

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