

IL-02

Poly(Ester Imide)s Possessing Low CTE and Low Water Absorption

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This paper describes the film properties of polyimides (PIs) containing para-ester linkages in the main chains. An ester-containing dianhydride monomer (TAHQ) was synthesized from hydroquinone and trimellitic anhydride chloride. Poly (ester imide)s (PEsIs) derived from THAQ and diamines with stiff/linear structures (PDA, CHDA, TFMB, APAB, DABA) exhibited low CTE (linear coefficient of thermal expansion) values, in particular, CTE=3 ppm/K for THAQ/PDA. The results revealed that the para-ester linkages behave as a rod-like segment favorable for thermal imidization-induced spontaneous chain orientation. Copolymerization with flexible ODA made possible precise CTE matching between PEsI/copper substrate and the significant improvement of film toughness. Novel PEsIs derived from other ester-containing dianhydrides and diamines were also investigated in this work. WAXD measurements showed that some of them were semi-crystalline. The present work proposes novel high temperature materials suitable for the FPC substrates, possessing not only Cu-level low CTE but also high film toughness, high dimensional stability, and low water uptake. Our PEsIs were compared with the corresponding amide-containing PIs. Highly transparent PEsIs will be also discussed.

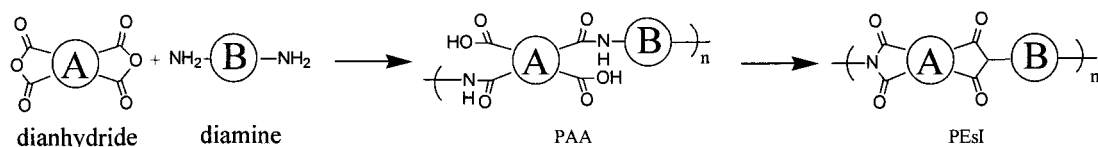


Figure 1. Synthetic route of Poly(ester imide)s.

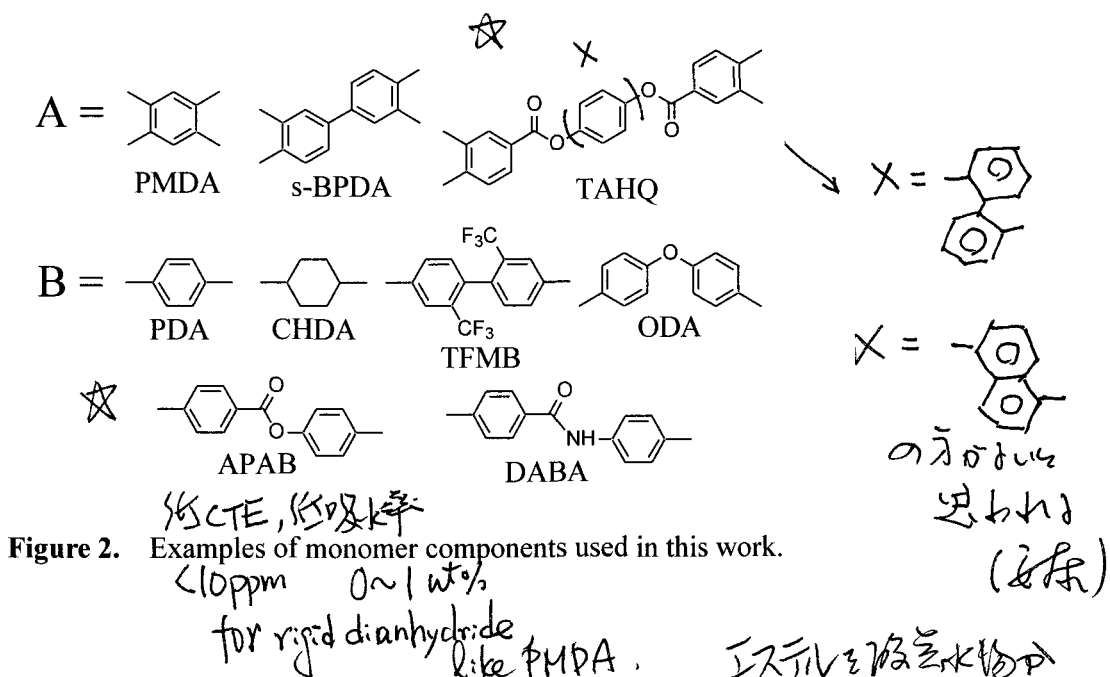


Figure 2. Examples of monomer components used in this work.