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Novel Asymmetric Aromatic Polyimide Having Excellent Space Environmental Stability and Application for Solar Sail “IKAROS” Membrane

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Structure–property relations for isomeric aromatic polyimides containing asymmetric aromatic imide structures have been discussed. Asymmetric polyimide 2,3,3',4' -oxyphthalic dianhydride(a-ODPA) with 4,4'-oxydianiline(4,4'-ODA) exhibited higher T_gs than those of symmetric s-ODPA/4,4'-ODA. Furthermore, the polyimide indicated a large drop in the storage modulus, E' beyond the T_g. Based on these results, novel asymmetric polyimide (ISAS-TPI) was developed for heat sealable polyimide film with high stability in space. This paper also presents an application of the thin ISAS-TPI film: the world's first solar sail membrane, used for “IKAROS”

Key Words : Polyimide, Asymmetric structure, 2,3,3',4'-oxyphthalic dianhydride, Heat-sealable, Space environment stability, Solar sail