

[IV~7]

Changes of Wettability of Ion Beam Treated PET with various Environments

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A PET film was irradiated by 1 keV Ar⁺ ion beam under oxygen environment. After the treatment, the modified PET was exposed to 25°C air and water, and the water contact angle was measured with time. When the treated PET was exposed to 25°C air, the contact angle which had been decreased by the irradiation increased significantly over the first day and then slowly, finally being saturated. On the contrary, the contact angle of treated PET remained almost constant as reserved in water.

The PET film exposed to air for 30 days after treatment was reserved into 0°C, 25 °C, 100 °C water, 25 °C xylene, acetone, ethanol and 100 °C air. The contact angle of the PET was decreased more quickly with increasing temperature of water and polarity of the solvent. On the other hand, the contact angle increased and reached the limiting value when exposed to 100 °C air.

From these results, it's concluded that the wettability of the treated PET depends on the temperature and polarity of the circumstance. This may be due to the segmental motion of the hydrophilic groups produced at the PET surface by the irradiation treatment. When exposed to nonpolar circumstance, the wettability of treated PET decreases with time because the hydrophilic groups at the surface may be oriented to the bulk side of the polymer. On the contrary, the wettability increases as exposed to polar one, which may be due to the fact that the hydrophilic groups are headed to the outside. In addition, the tendency of chain rotation increases with increasing temperature of the circumstance.