

等离子体改性聚合物表面动力学的动态接触角法研究

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**摘要** 不同聚合物经CF<sub>4</sub>/CH<sub>4</sub>等离子体处理后,在浸水过程中表面动力学衰减常数对温度通过Arrhenius关系作图,对于所研究的聚合物都有一个明显的转折点。转折点处的温度称作表面构型转变温度(T<sub>s</sub>),大约为15℃,与表面邻近水的Drost-Hansen温度一致。T<sub>s</sub>以上及以下的活化能数值较小,说明表面构型变化的本质可看作是由于基团的翻转运动,而不需要整个大分子或链段的迁移运动。在浸水过程中,接触角滞后Δθ在表面构型转变温度T<sub>s</sub>附近有转变,并有极小值,此后随着温度的升高出现极大值,继续升高温度接触角滞后Δθ又反而下降。

**关键词** [等离子体](#) [甲烷](#) [四氟化碳](#) [表面改性](#) [接触角](#) [高聚物](#)

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## The investigation of polymer surface dynamics modified by plasma by using dynamic contact angle method

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**Abstract** This paper studied the surface dynamics for some polymers treated by CF<sub>4</sub>/CH<sub>4</sub> plasma during the immersion of water at different temperatures. Arrhenius plots of the surface dynamic decay rate constants showed conspicuous breaks at characteristic surface transition temperature T<sub>s</sub>. T<sub>s</sub> represents the change of driving force due to the change in basic properties of water in contact with a surface (vicinal water) at the major Drost-Hansen temperature at 15 °C. The activation energies for the surface configuration change in the water immersion case are found to be small. Results indicate that the surface configuration changes do not require large segmental motions or migration of macromolecules. Motions responsible for surface configuration changes could be well perceived as relatively small rotational motions of the introduced chemical moieties from the surface into the bulk of the film. The dynamic contact angle hysteresis for different polymers treated by CF<sub>4</sub>/CH<sub>4</sub> plasma had minimum at T<sub>s</sub>. The hysteresis increases at temperature of higher than T<sub>s</sub>, and reaches a maximum, then decreases along with the increase of temperature.

**Key words** [PLASMAS](#) [METHANE](#) [CARBONTETRAFLUORIDE](#) [SURFACE MODIFICATION](#) [CONTACT ANGLE](#) [HIGHPOLYMER](#)

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