

Surface Molecular Diffusion of Latex Films Observed by Atomic Force Microscopy

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Surface molecular diffusion in a latex film has been investigated by atomic force microscopy. Deformation of the particles in the plane of the film did not change the centre-to-centre spacing, but the peak-to-valley distance, y , decreased upon annealing. The theoretical, and also the experimental, relationship between y and time, t , is as follows.

$$y(t) = y(0)\exp(-t/\tau)$$

τ is a constant which is related to surface tension, particle size and the surface molecular diffusion coefficient. By measuring the change of y with time, the surface molecular diffusion coefficient may be obtained. The surface molecular diffusion coefficient for a poly(methyl methacrylate-co-butylacrylate) (50:50) copolymer latex film at 65°C was found to be $1.4 \times 10^{-13} \text{ cm}^2/\text{s}$.

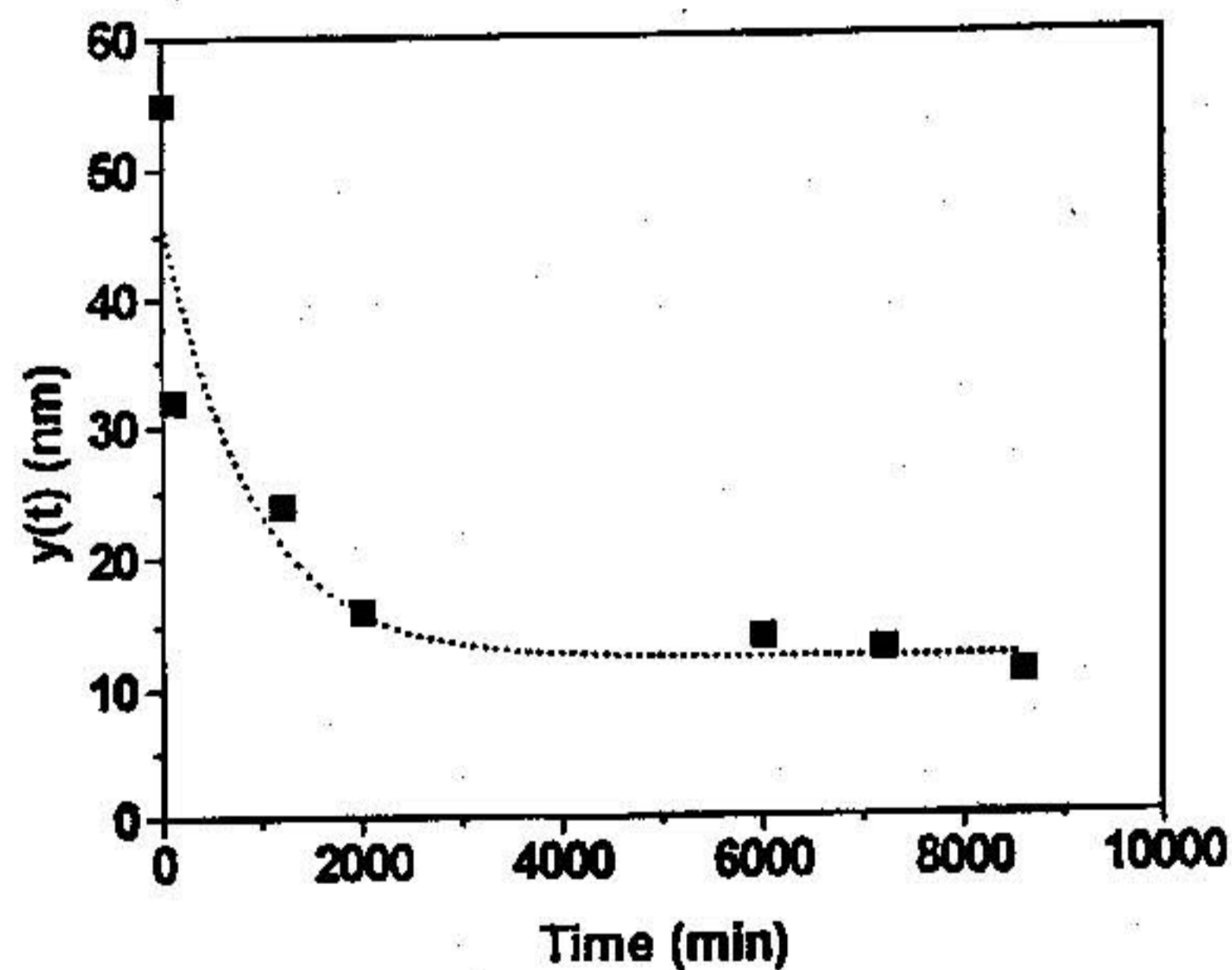


Fig 1. Theoretical and experimental results. Square points are the experimental data.