高分子ブレンド薄膜の相分離と脱濡れ

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We studied morphology and kinetics of phase separation and dewetting in thin films of polystyrene (PS) and poly(vinyl methyl ether) (PVME) blend on glass substrate using small-angle light scattering, optical microscope (OM), atomic force microscope (AFM) (see Figure 1) and neutron reflectivity. Morphology and kinetics of phase separation were identical to the reported bulk ones for the films above ~10 μm, while the characteristic wavelength of composition fluctuations due to the phaseseparation decreased with the film thickness below ~10 μm and disappeared below ~1 μm. Below this film thickness we found dewetting was triggered in addition to the phase separation. A characteristic wavelength was again observed in light scattering profiles below ~100 nm, which was assigned to that of the dewetting. In addition to the composition fluctuations in the direction parallel to the surface we also examined the fluctuations normal to the surface using time-resolved neutron reflectivity. In the meeting we discuss the relation between the phase separation and the dewetting as a function of film thickness.

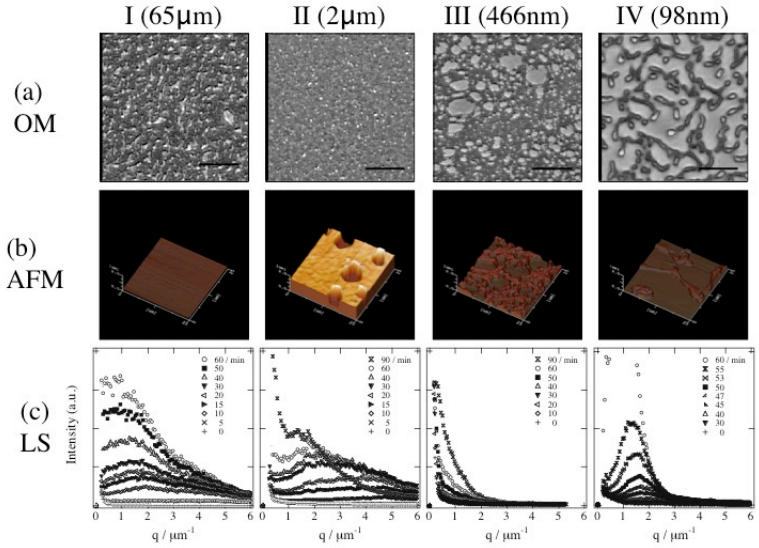

Figure 1. OM (a) and AFM (b) images of PS/PVME blend thin films after temperature jump to 115 °C in the two phase region for four thickness regions, and time evolution of LS profiles (c) after temperature jump to 115 °C in the two phase region.