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Pinning effects from substrate and AFM tip surfaces on interfacial nanobubbles HIDEAKI TESHIMA, KOJI TAKAHASHI, YASUYUKI TAKATA, Kyushu University, TAKASHI NISHIYAMA, Fukuoka University — Measurement accuracy of atomic force microscopy (AFM) is vital to understand the mechanism of interfacial nanobubbles. In this study, we report the influence of pinning derived from both substrate and AFM tip surfaces on the measured shape of interfacial nanobubbles in peak force tapping mode. First, we pushed the nanobubbles using the AFM tip with high peak force setpoint. As a result, the deformed nanobubbles kept their flat shape for several tens of minutes. We quantitatively discuss the pinning force from substrate surface, which retains the flat shape enhancing the stability of nanobubbles. Next, we prepared three AFM tips with different wettability and measured the nanobubbles with an identical setpoint. By comparing the force curves obtained during the measurements, it seems that the (middle-)hydrophobic tips penetrated the liquid/gas interface and received repulsive force resulting from positive meniscus formed by pinning at the tip surface. In contrast, hydrophilic tip didn't penetrate the interface and received the force from the deformation of the interface of the nanobubbles. In addition, the measurements using the (middle-)hydrophobic tips led to the underestimation of the nanobubbles profile corresponding to the pinning position at the tip surfaces.

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