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Wettability Behavior of Organic Silane Molecules with Different Alkyl-Chain Length Coated Si Surface

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Abstract : Control of surface wettability is very important in various industrial fields. Thus, contact angle hysteresis which is defined as the difference between advancing and receding water contact angles has been paid attention because the surface having low contact angle hysteresis can control wetting behavior of water droplet. Self-assembled monolayer (SAM) formed using organic silane molecules has been used to control surface wettability, in particular, static contact angles, however, the effect of alkyl-chain length in organic silane molecules on the contact angle hysteresis has not yet clarified. In this study, we aimed to investigate the effect of alkyl-chain length (C1-C18) in organic silane molecules on the contact angle hysteresis. SAMs were formed on Si wafer by thermal CVD method using silane coupling agents having different alkyl-chain length. The static water contact angles increased with an increase in the alkyl-chain length. On the other hand, although the water contact angle hysteresis tended to decrease with an increase in the alkyl-chain length, in case of the alkyl-chain length of more than C16 the contact angle hysteresis increased. This could be due to the decrease in the molecular mobility because of the increase in the molecular packing density in chemisorbed silane molecules.

Keywords : alkyl-chain length, self-assembled monolayer, silane coupling agent, surface wettability
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