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Wettability control in C-SiOx film formed by plasma polymerization of HMDSO/O_2 mixture

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Wetting phenomena have been heavily studied for industrial and academic researches especially tuning the wettability between hydrophilicity and hydrophobicity. Wicking through the surface texture is shown on superhydrophilic surface while rolling (or dewetting) on the patterns of superhydrophobic surface. These wetting phenomena are known to be affected by surface wettability determined with physical surface patterns as well as chemical composition of surface layer.

In this research, we introduce a method to control the wettability of a thin C-SiOx film from hydrophobic to hydrophilic using a mixture gas of HMDSO/O_2 by plasma polymerization with rf-CVD (radio frequency-Chemical Vapor Deposition). Wettability was finely controlled by changing the ratio of HMDSO/O_2. Hydrophilicity increased as the ratio decreased, while hydrophobicity was enhanced by the ratio. Moreover, fine control from superhydrophilicity to superhydrophobicity was achieved by C-SiOx coating on the Si wafer with prepatterns of submicron-sized pillar array formed by CF_4 plasma etching.

Keywords: Wettability, Wetting, CVD, HMDSO