

【S-28】

Adsorption and Decomposition of Dimethylisopropylsilane on Si(111) Surface

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The adsorption and decomposition of dimethylisopropylsilane, $(\text{CH}_3)_2\text{CHSiH}(\text{CH}_3)_2$ on Si(111) surface have been studied in the temperature range 130 - 1300 K under ultrahigh vacuum conditions. After exposing the Si(111) surface to DMIPS at 130 K, a peak centered at ~ 160 K appeared in the TD spectra. In addition, desorption of $(\text{CH}_3)_2\text{CHSiH}$ ($m/z = 72$), $\text{Si}(\text{CH}_3)_2$ ($m/z = 58$), and C_3H_5 ($m/z = 41$) took place at 210, 350, and 600 K, respectively. The results of low-energy Cs ion reactive scattering indicate that the adsorbed DMIPS partially decomposes to yield $\text{C}_4\text{H}_x\text{Si}$ ($x = 8-11$) and $\text{C}^2\text{H}_x\text{Si}$ ($x = 6-7$) species at 130 K. $\text{Si}(\text{CH}_3)_2$ further decomposes to form CH_xSi species upon increasing the substrate temperature up to ~ 600 K. Above 800 K, the intermediate species completely decompose to form SiC.