S-P03

The Study of Mechanism of Thermal Decomposition of Dimethylisopropylsilane on Si(100) Surface.

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The Reactive Ion Scattering (RIS) investigation showed that Dimethylisopropylsilane (DMIPS) physisorbed on the Si(100) surface without dissociation when the temperature was less than 100 K. DMIPS adsorbed in multilatyer desorbed as the temperature increased, and showed a maximum desorption peak at 114 K. Surface adsorbed layer showed a maximum desorption peak at 130 K and decomposed to the C_3SiH_8 and the C_4SiH_{12} by a surface reaction. These intermediates existed on the surface at the temperature above 120 K and decomposed to $CSiH_4$ over 160 K. It was confirmed by the RIS experiment that the second intermediate, $CSiH_4$, existed stable on the surface up to 700 K. The desorption of DMIPS and hydrogen, H_2, was observed by TDS. Two desorption peaks for hydrogen were observed at 645 K and 880 K. The Temperature Programmed Reactive Ion Scattering (TPRIS) investigation showed that the intensity of the $CSiH_4$ mass disappeared at 850 K. This result confirmed that the hydrogen desorption peak at 645 K originated from the surface hydrogen decomposed from DMIPS at the low temperature, and that another peak at 880 K from the decomposition of $CSiH_4$ to SiC. Although the RIS experiment couldn't show any evidence on the surface adsorbate over 900 K, the AES results showed that carbon atoms existed on the surface. This result means the SiC formation on the surface.