

[23-S09]

Adsorption and Desorption of Acetylene on Ge(100)

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The adsorption and thermal desorption of acetylene on Ge(100) have been studied in ultrahigh vacuum by Auger electron spectroscopy (AES) and temperature-programmed desorption (TPD). Acetylene is found to chemisorb and to desorb molecularly on Ge(100) via a mobile precursor in a different way with Si(100)⁽¹⁾. TPD measurements show two molecular desorption features, indicating two adsorption states. For desorption kinetics, C₂H₂ desorption follows a first order reaction and the activation energies for desorption are 30.6 kcal/mol for α_1 state and 32.9 kcal/mol for α_2 state at saturation coverage. The low desorption activation energy allows C₂H₂ to desorb prior to significant dissociation which is a major pathway in desorption from Si(100). The angular distribution of C₂H₂ desorption is peaked at surface normal. The results will be discussed on the basis of bonding geometry of C₂H₂ on Ge(100).