

Adsorption Structure of Valine on Ge(100)

Young-Sang Youn¹, Hangil Lee^{2*}, Sehun Kim^{1*}

¹Department of Chemistry, KAIST

²Department of Chemistry, Sookmyung Women's University

The adsorption geometry of valine molecules on Ge(100) surface were investigated by observing four core-level spectra (Ge 3d, C 1s, N 1s, and O 1s) using high-resolution core-level photoemission (HRCLPES). In the HRCLPES spectrum, the binding energy of the single N 1s peak in the system of valine on Ge(100) surface is similar to that of glycine, ammonia, and alanine adsorbed on Ge(100) surface via a N dative bonding. Moreover, O 1s signal is divided two non-equivalent oxygen atoms, indicating that only one oxygen atom in carboxyl group of valine molecule participates in the bonding with Ge(100) surface. As a result, we confirm that both amine and carboxyl groups in valine molecule concurrently take part in the adsorption on Ge(100) surface with the 'intrarow O-H dissociated and N dative bonded structure'. This adsorption geometry is consistent with the adsorption structure of glycine and alanine at low initial coverage on Ge(100) surface. This means that the steric hindrance effect due to an isopropyl group in valine molecule don't occur in the adsorption process of valine on Ge(100) surface. Therefore, the steric hindrance effect owing to large R-group of valine molecule could be neglected. Through this work, we provide definite information about the fact that the inert large R-group of valine molecule do not play an important role during adsorption procedure. Therefore, our result will give a chance to infer the adsorption geometry of valine on the group-IV semiconductor surfaces as well as of leucine and isoleucine on Ge(100) surface.