S-P02

Adsorption Behavior of Vinylferrocene on Ge(100)

Young Bin Kim, Soon Jung Jung and Sehun Kim

Department of Chemistry and School of Molecular Science (BK21),
Korea Advanced Institute of Science and Technology, Daejeon, Korea

The adsorption structures and the nanoscale phenomena of vinylferrocene on Ge(100) have been studied using scanning tunneling microscopy (STM) under ultrahigh vacuum (UHV). The STM investigation revealed that vinylferrocene adsorbs onto Ge(100) surface with three different geometries: (i) a Ge-Fe dative boning configuration, (ii) a Ge-Cp dative bonding configuration and (iii) a di-σ bonding configuration through a [2+2] cycloaddition. The STM images recorded in real time demonstrate that each dative bonding feature is accompanied with distinct molecular motions at the surface. The Ge-Fe dative bonding configuration shows a single molecular seesaw motion of a ferrocene moiety. The seesaw motion is likely due to the temporarily enhanced interaction between a cyclopentadiene (Cp) ring and a down-Ge atom. In the case of the Ge-Cp dative bonding configuration, one-dimensional random walk in between two neighboring Ge dimer rows was observed. On the other hand, the di-σ boding configurations do not show such dynamic surface motion, because the molecules bonded covalently through the [2+2] cycloaddition reaction are expected to have relatively strong interaction with surface, compared to the molecules bound to surface via coordinative interaction. The temperature dependent STM measurement was also carried out to investigate the thermal stability of each adsorption structure. In this presentation, the detailed adsorption geometry and the molecular behavior of each distinct configuration will be introduced.