STM study of azobenzene self-organized on the Ag/Ge(111)-\( (\sqrt{3} \times \sqrt{3})R30^\circ \) surface

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The interfacial structures of organic molecule, azobenzene, on Ag/Ge(111)-\( (\sqrt{3} \times \sqrt{3})R30^\circ \) (replaced as Ag/Ge(111)-\( \sqrt{3} \)) under ultrahigh vacuum conditions were studied by low-temperature scanning tunneling microscopy (LT-STM). Azobenzene is an important molecule because it undergoes a reversible, photoactive trans-cis isomerization that may allow it to serve as an optically active device. The STM images of azobenzene adsorbed on Ag/Ge(111)-\( \sqrt{3} \) were properly resolved. The overlayer of azobenzene was found to form a \( (2\times1) \) structure as shown in Figure 1.

Due to the excellent matching the molecular lengths of azobenzene with the lattice constant of Ag/Ge(111)-\( \sqrt{3} \), the molecular films deposited onto Ag/Ge(111)-\( \sqrt{3} \) form three equivalent domains which were rotated by 120\(^\circ\). High resolution images allowed the identification of individual molecules and the image of azobenzene appeared as a dumbbell sharp, similar to the related stilbene molecule that has been observed in films on the Ag/Ge(111)-\( \sqrt{3} \) surface\(^1\). The azobenzene molecule consists of two phenyl rings connected by a pair of doublebonded nitrogen atoms. The hydrogen bonds may be formed, as shown in the cycle in Figure2 (a). Figure 2(b) is our proposed model.

References


Figures:

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