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

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The interfacial structures of organic molecule, azobenzene, on Ag/Ge(111)-($\sqrt{3}\times\sqrt{3}$)R30° (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 (2×1) 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° . 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

[1] C.-S. Tsai, C. Su, J.-K. Wang, J.-C. Lin, *Langmuir,* **19** (2003), 822-829

Figures:

Figure 1 Figure 2(a) Figure 2(b)