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Title	Aligned Disilanyl Double-Pillared Bisanthracene on Alkanethiol Self-Assembled Monolayer observed by Molecular Resolution STM
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Aligned Disilanyl Double-Pillared Bisanthracene on Alkanethiol Self-Assembled Monolayer observed by Molecular Resolution STM

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Molecular resolution scanning tunneling microscopy (STM) is a powerful tool to observe the π -conjugated molecular orbital of individual molecules. We have identified the individual endohedral metallofullerene molecules on alkanethiol self-assembled monolayers (SAMs) by STM.^{1,2} Recently, a new bipolar carrier transport material of disilanyl double-pillared bisanthracene (^{Si}DPBA) has been synthesized.³ Here, we demonstrate the molecular resolution STM images and scanning tunneling spectroscopy of ^{Si}DPBA and discuss the alignment of ^{Si}DPBA molecules on alkanethiol SAMs.

The anthracene derivative, ^{Si}DPBA, was designed without importing structural motifs established for hole and electron transport materials, and was synthesized in a one-step operation from 1,8-diiodoanthracene.

Figure 1 shows the STM images of ^{Si}DPBA molecules on the heptanethiol/Au(111) surface at 65K. In Figure 1, a striped structure of alkanethiol SAMs are observed as the background, and bright points represent individual ^{Si}DPBA molecules. As the interstripe spacing was 0.5 nm, the heptanethiol molecules are close-packed within the row. From the STM images, ^{Si}DPBA molecules can diffuse on the heptanethiol SAM surface and were aligned in line at the edge of the row where sulfur atoms exist. These molecular diffusions are due to the weak bond caused by the van der Waals interaction between molecules and the alkanethiol SAM. In ^{Si}DPBA molecules, various striped molecular orbital patterns are observed in Fig. 1. We compare the STM image of ^{Si}DPBA molecules with Kohn-Sham molecular orbitals of ^{Si}DPBA calculated by density functional theory (DFT).

Reference

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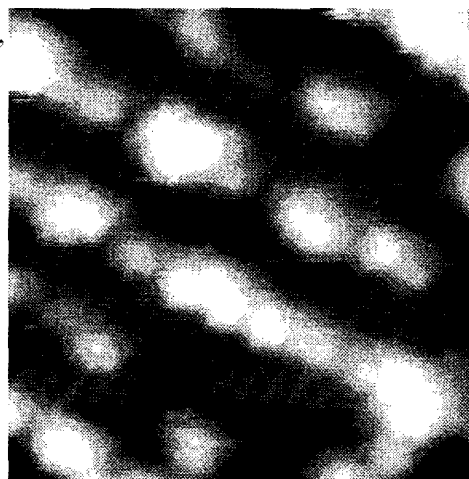


Figure 1. STM image of ^{Si}DPBA on heptanethiol SAM (10x10 nm²)