Scanning Tunneling Microscopy of Organic Molecules on the Cu(110)-(2×1)O Striped Phase

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The deposition of molecules onto single-crystal surfaces allows their investigation at the single-molecule level by scanning tunnelling microscopy (STM), in particular for planar molecular structures. Here, we have studied flat organic molecules on the Cu(110)-(2×1)O stripe phase under ultra-high vacuum conditions with low-temperature STM. The Cu(110)-(2×1)O stripe phase is of particular interest since it offers alternating stripes of (metallic) Cu(110) areas and of oxygen-covered copper areas where the molecules are slightly decoupled from the metal substrate.

Previously, the Cu(110)-(2×1)O striped phase was used as a template for the synthesis of organometallic structures having different sizes and shapes depending on the width of copper stripes [1].
The focus of our study is first, whether it is possible to use this nanostructured surface as a template for the synthesis of covalent polymers.

Second, we have studied the preferred adsorption configuration and orientation of the linear oganometallic chains on the surface. We have found the coexistance of several principal structures and investigated how thermal annealing changes their orientation.

[1] Qitang Fan, Jingya Dai, Tao Wang, Julian Kuttner, Gerhard Hilt, J. Michael Gottfried, and Junfa Zhu, ACS Nano, 3 (2016), 3747-3754