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 tunneling microscopy (STM) and gives access to the controllable on-surface synthesis of 2D materials.
Here, we have studied dibromo-p-terphenyl molecules on the Cu(110)-(2×1)O striped phase under ultra-high vacuum conditions with low-temperature STM. The Cu(110)-(2×1)O striped phase is of particular interest since it offers alternating stripes of (metallic) copper areas and of oxygen-covered areas where the adsorbed organic molecules are slightly decoupled from the metal substrate and hence have higher mobility.
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 how thermal annealing affects the molecular adsorption on the surface. It turns out that the molecules form organometallic chains on the copper areas, oriented in three surface directions. Increasing the sample temperature from 300 K to 450 K changes the orientation of the organometallic chains. Additionally, the shape of the Cu-O areas is distorted after annealing so that the stripes loose their long straight borders.

References

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