Nanomanipulation of C_{60} islands on organic layer compound crystals

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Organic layered compound crystals have rarely been investigated by means of room temperature non-contact atomic force microscopy (nc-AFM). This kind of layered material offers the possibility to design surfaces with anisotropic friction properties by the choice of suitable molecular orientations [1].

In this study the behaviour of fullerene (C_{60}) molecules on the salt bis(benzylammonium)bis(oxalate)cupurate(II) (BNL) was investigated. BNL is a transition-metal oxalate complex which exhibits layer-type crystal structures (see Fig. a) [2]. The C_{60} molecules were deposited on the substrate by thermal deposition and formed small islands (see Fig. b). High resolution images of the substrate and the C_{60} islands were obtained. Manipulations of the molecular islands have been induced by controlled tip interactions. Large scale displacements of these islands were performed up to several hundreds of nanometres. It was also observed that they can be split up and redistributed by these interactions to form larger islands. Tip-induced shape modifications of these C_{60} islands were also observed and analysed.

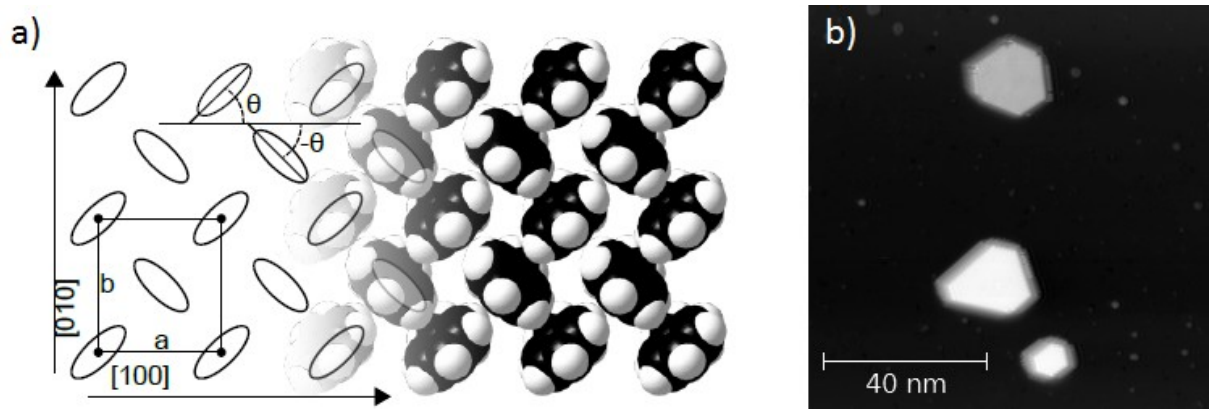

Figure: (a) Top view of the BNL (001) crystal surface with alternating molecular orientations. The molecules are rotated by θ = ±48° with respect to the [100] direction. The lattice parameters are a = 0.71 nm and b = 0.80 nm. (b) Hexagonal and triangular islands formed by the C_{60} molecules on BNL.

References
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