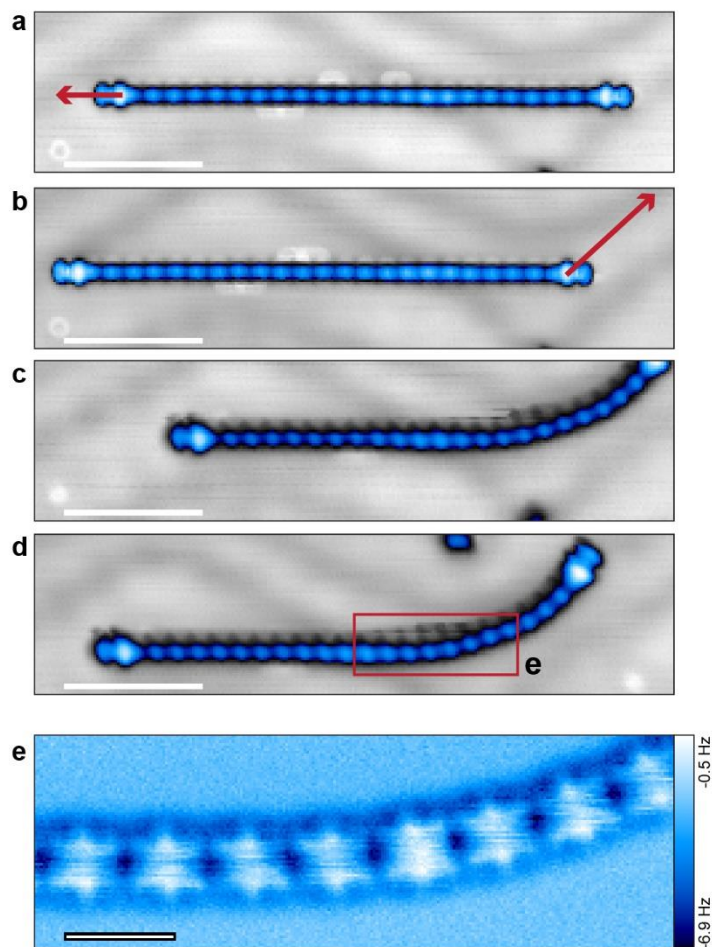
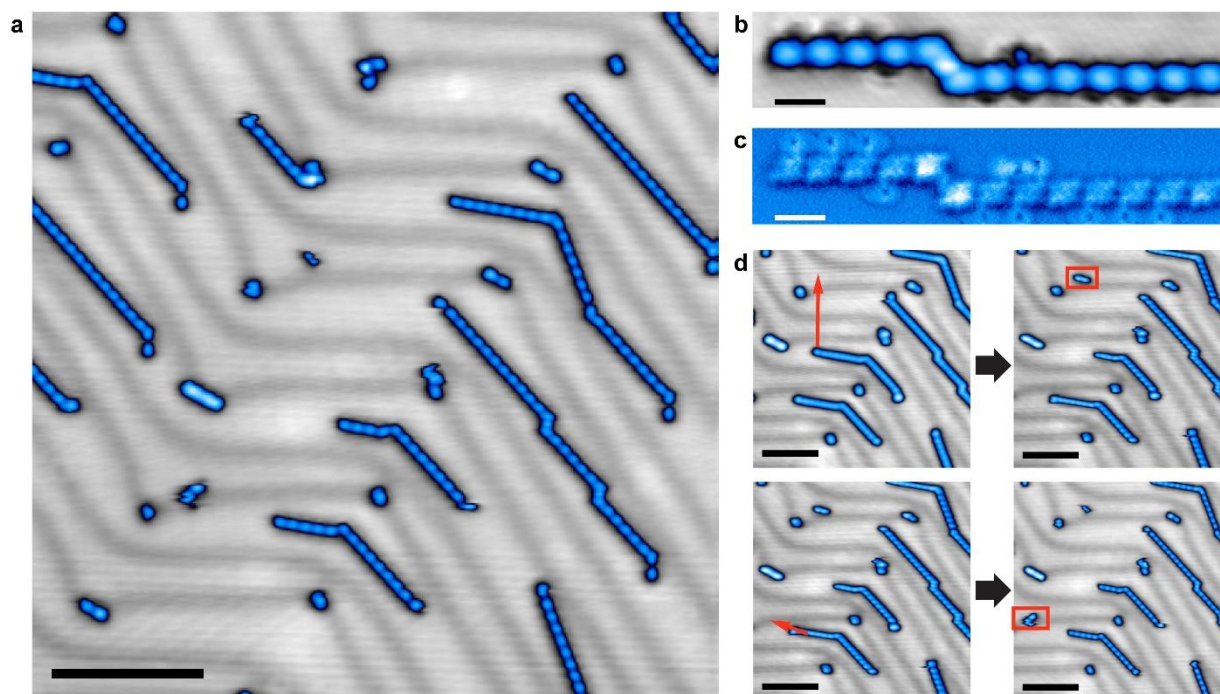


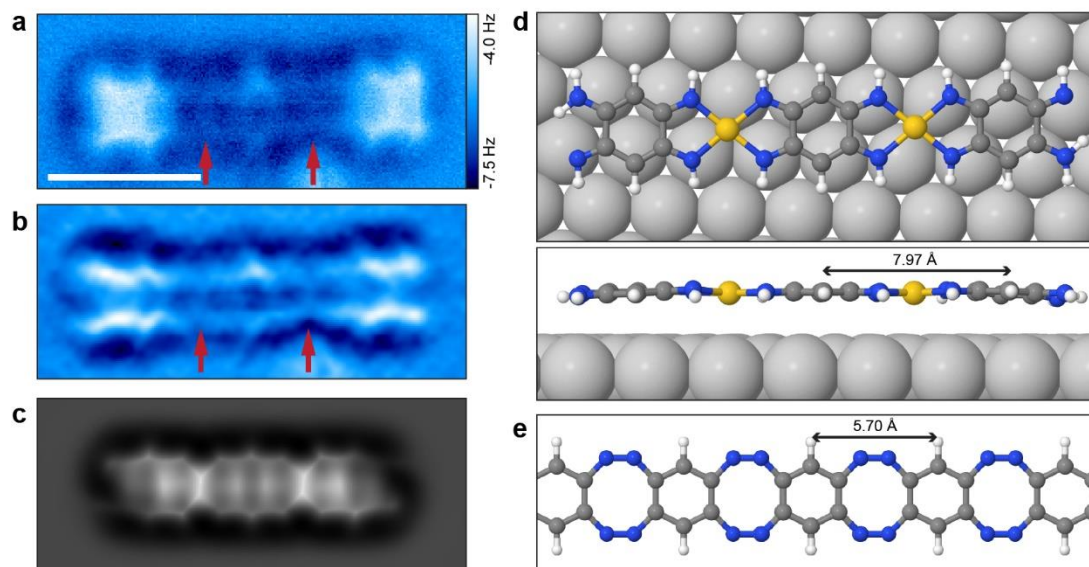
## Extended data figures and tables



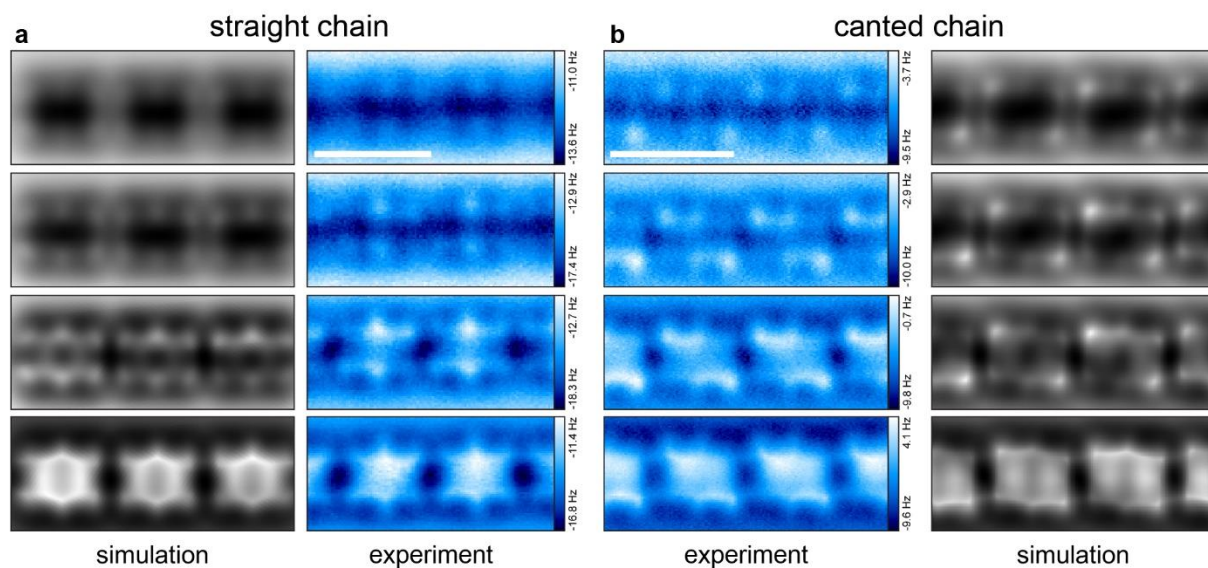
**Extended Data Figure 1:** a)-d) From top to bottom: sequentially acquired STM images of a manipulation experiment with straight chain. Red arrows represent the probe movement after contacting the chain end (procedure detailed in Methods). End states remain intact during all manipulation steps. (all images 5 mV, 10 pA, scale bars 5 nm) e) Experimentally acquired high resolution AFM image of the curved part (red rectangle in image d)) of straight chain after the last manipulation (scale bar 1nm).



**Extended Data Figure 2:** a) Representative overview STM image of canted molecular chains. (140 mV, 20 pA, scale bar 10 nm) b) Close-up STM image of canted chain showing the absence of bright spots at the chain ends (140 mV, 20 pA, scale bar 1 nm). c) High resolution AFM image of the same chain showing its inner structure with visibly canted molecular units. d) STM images (140 mV, 20 pA) taken before and after two manipulation experiments. Red arrows represent the probe movement after contacting the chain end (procedure detailed in Methods). Images on the right side (after the manipulation) show apparent splitting of the chain into segments. Scale bars 10 nm.



**Extended Data Figure 3:** a) Experimentally acquired high resolution AFM image of a trimer with incorporated Au adatoms. (scale bar 1 nm) b) High pass filtered version of AFM image a). Red arrows mark the characteristic “x-like” feature in between ligand units. c) Simulated high resolution AFM image based on the model shown in d). d) DFT calculated model of a trimer with incorporated Au adatoms on Au(111) surface - top and side view showing a minor out-of-molecular plane relaxation of gold atoms towards the surface. e) DFT calculated model of a chain composed of covalently bonded molecules with periodicity 5.7 Å, ~30% shorter than the Au coordinated structure.



**Extended Data Figure 4:** Comparison between experimental AFM images of straight and canted chains acquired at different tip-heights and their respective simulated AFM images. (scale bars 1 nm)