

Supporting Information

Length-dependent symmetry in narrow chevron-like graphene nanoribbons

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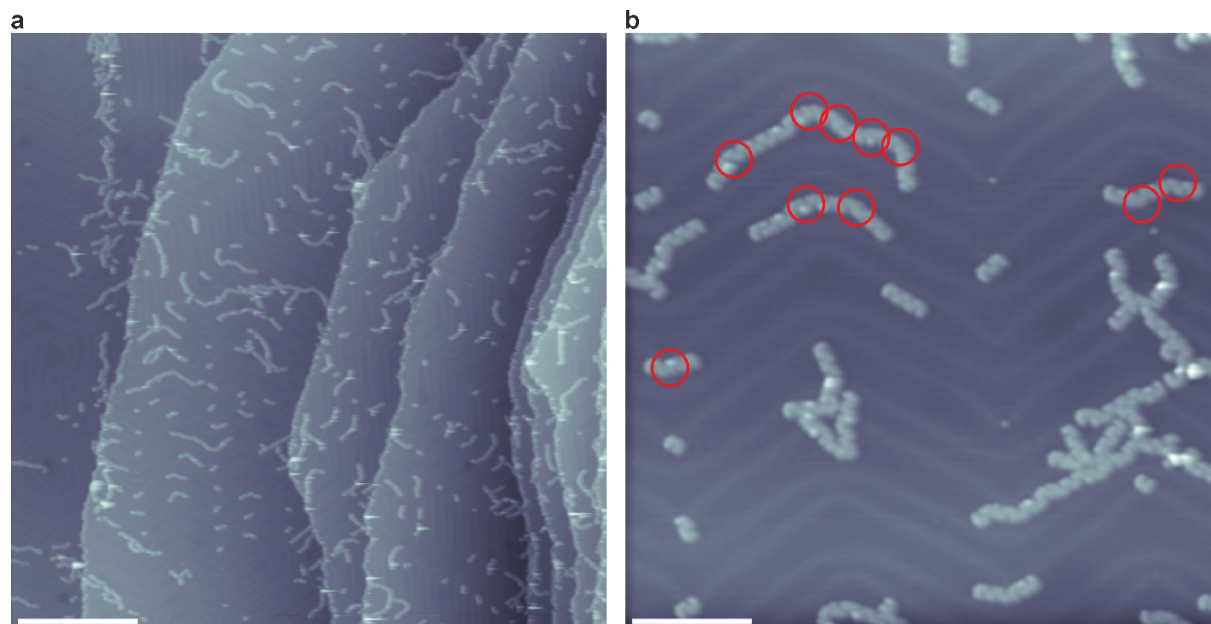


Figure S1. a,b) Overview STM images of the narrow chevron-like GNRs synthesized on Au(111). The ribbons have a distinct chevron shape. Several junctions between GNRs are highlighted by red circles. Scale bar and scanning parameters: a) scale bar = 40 nm, $V_{\text{bias}} = -1.88$ V, $I_{\text{set}} = 20$ pA, b) scale bar = 10 nm, $V_{\text{bias}} = -1.5$ V, $I_{\text{set}} = 20$ pA.

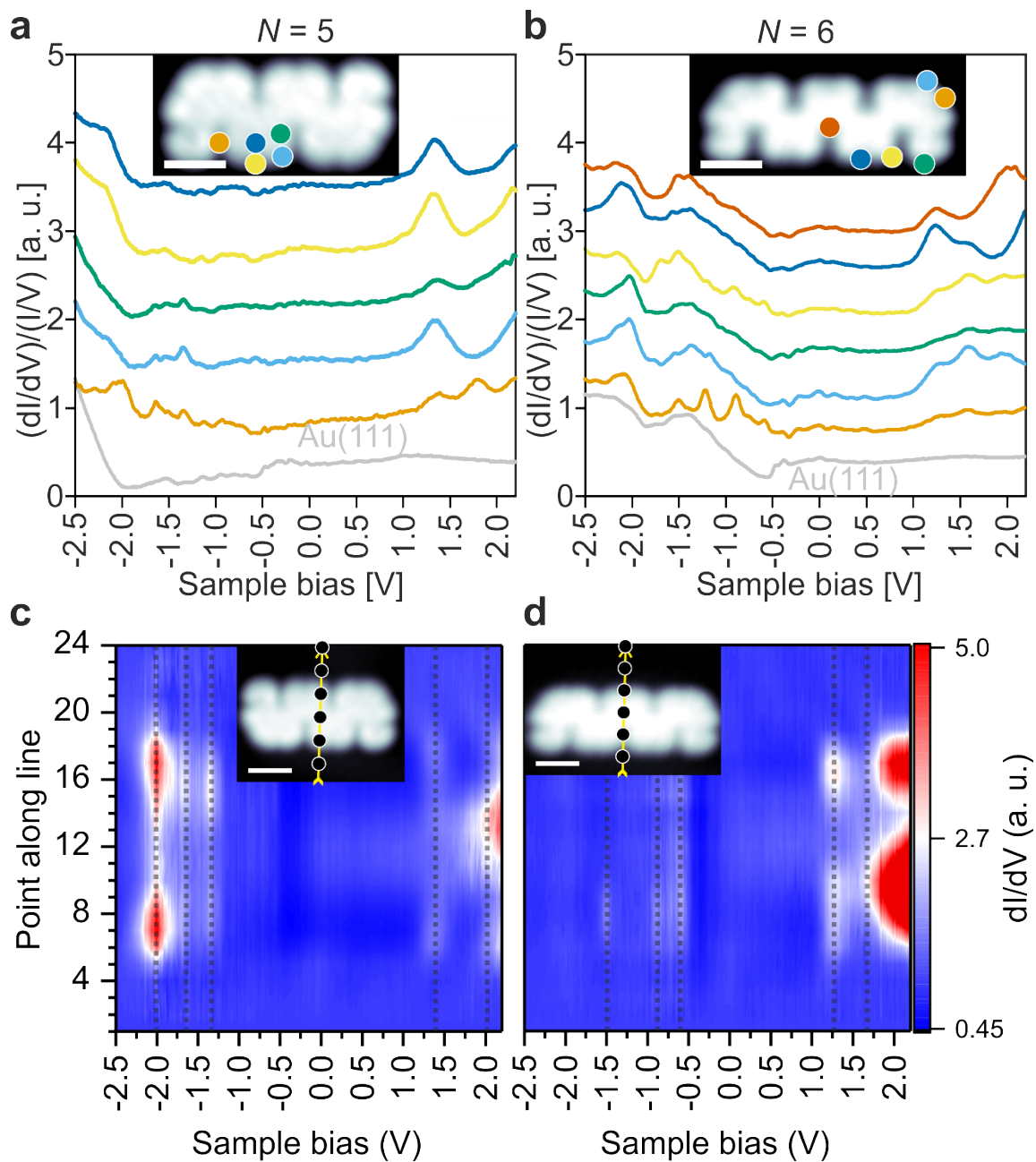


Figure S2. a,b) dI/dV point spectra for a 5- and 6-unit long ribbon, respectively. The spectra were recorded on the positions indicated in the inset. c,d) 2D heatmaps obtained by recording dI/dV point spectra along a line indicated in the inset. For clarity, only every fourth point is indicated. Scale bars and scanning parameters: a,c) scale bar = 1 nm, $V_{\text{bias}} = -1.25$ V, $I_{\text{set}} = 150$ pA, c,d) scale bar = 1 nm, $V_{\text{bias}} = -0.95$ V, $I_{\text{set}} = 200$ pA.

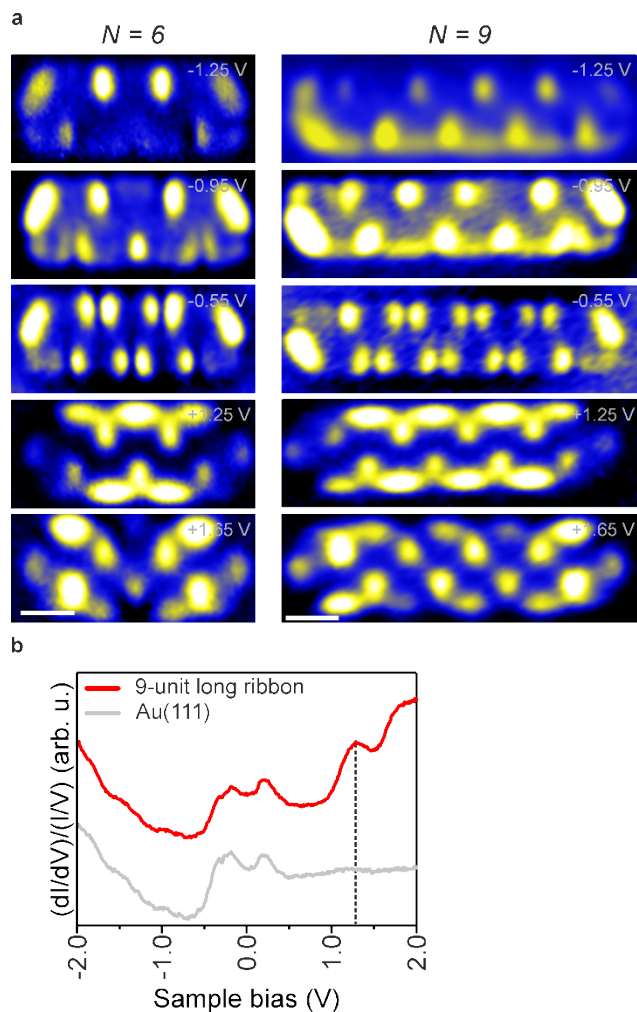


Figure S3. a) dI/dV maps for 6- and 9-unit long GNRs. The dI/dV maps are recorded at the same energy and display the same electronic orbitals, thus the GNRs have the same band gap. b) Average of 8 dI/dV point spectra recorded on several locations on a 9-unit long ribbon. The occupied states were not observed in point spectra, however they are observable in the dI/dV maps. Scale bar and scanning parameters: a) scale bars = 1 nm, from top to bottom (for both 6- and 9-unit long GNRs): $V_{\text{bias}} = -1.25$ V, -0.95 V, -0.55 V, 1.25 V, 1.65 V and $I_{\text{set}} = 200$ pA, 200 pA, 120 pA, 200 pA, 200 pA.

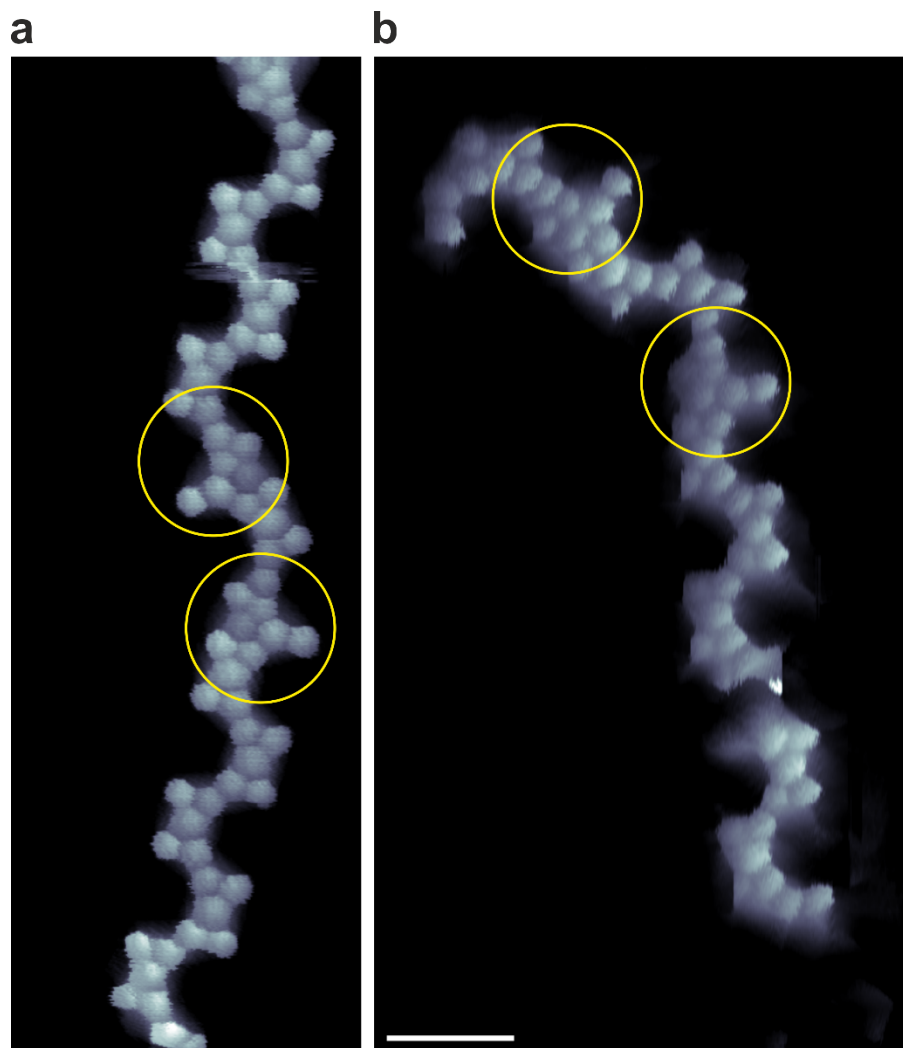


Figure S4. a,b) High resolution constant height STM images recorded with a CO functionalized tip revealing multiple junctions between GNRs. The junctions are highlighted by the yellow circles. Scale bar and scanning parameters: a,b) scale bar = 1 nm, $V_{\text{bias}} = 10$ mV.

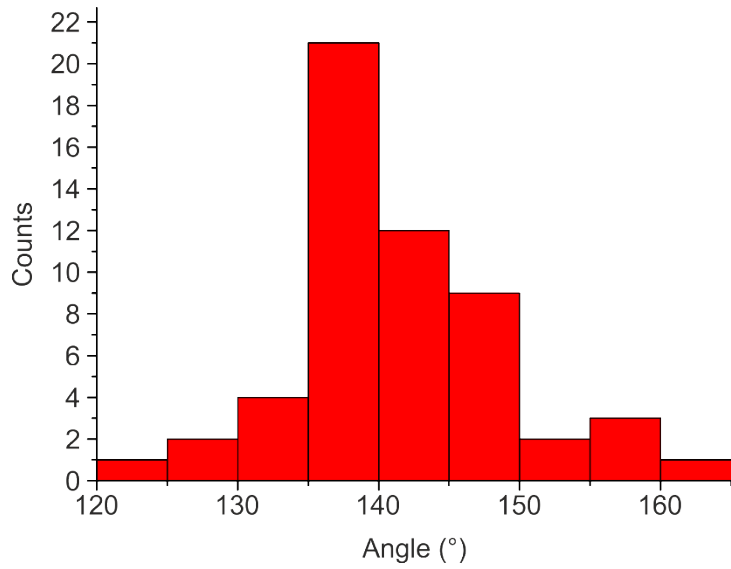


Figure S5. Frequency plot displaying the measured angle at which a junction between two GNRs is formed versus the number of times it was found in the data set. In total, 55 angles were measured.

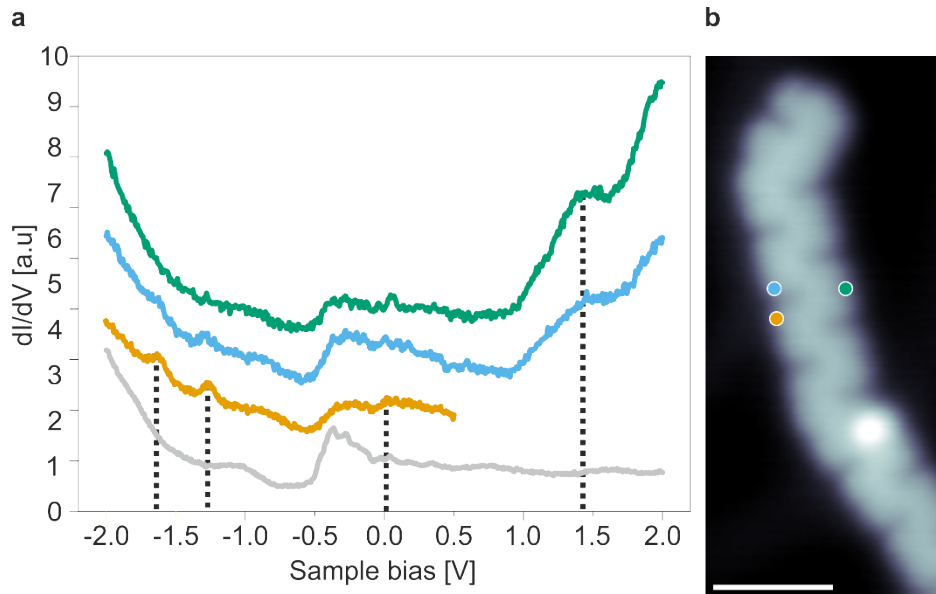


Figure S6. a) dI/dV point spectra recorded on a long GNR with many defects of various types. It is clear that the electronic properties of the ribbon are altered with respect to a pristine GNR. The positions where the spectra were recorded are shown in Figure S8b. b) STM image of the ribbon on which the spectra were recorded. Scale bar and scanning parameters: b) scale bar = 2 nm, $V_{\text{bias}} = -1.5$ V, $I_{\text{set}} = 150$ pA.

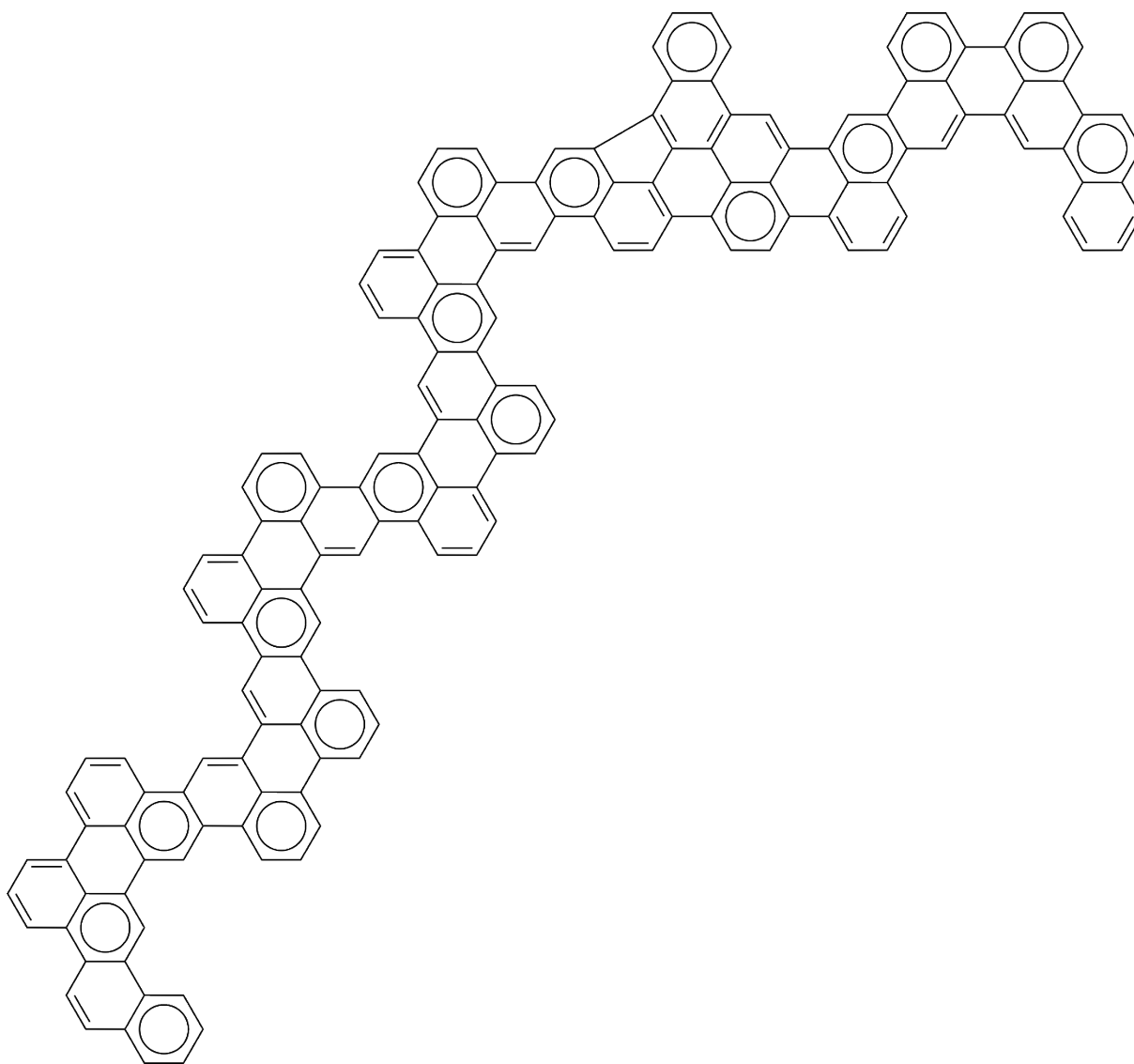


Figure S7. A Clar structure of the 6-3 junction. The Clar structure of the 6- and 3-unit long side are the same as for an isolated 6- and 3-unit long ribbon, respectively.