Potential and concentration-dependent self-assembly structure at solid/liquid interface

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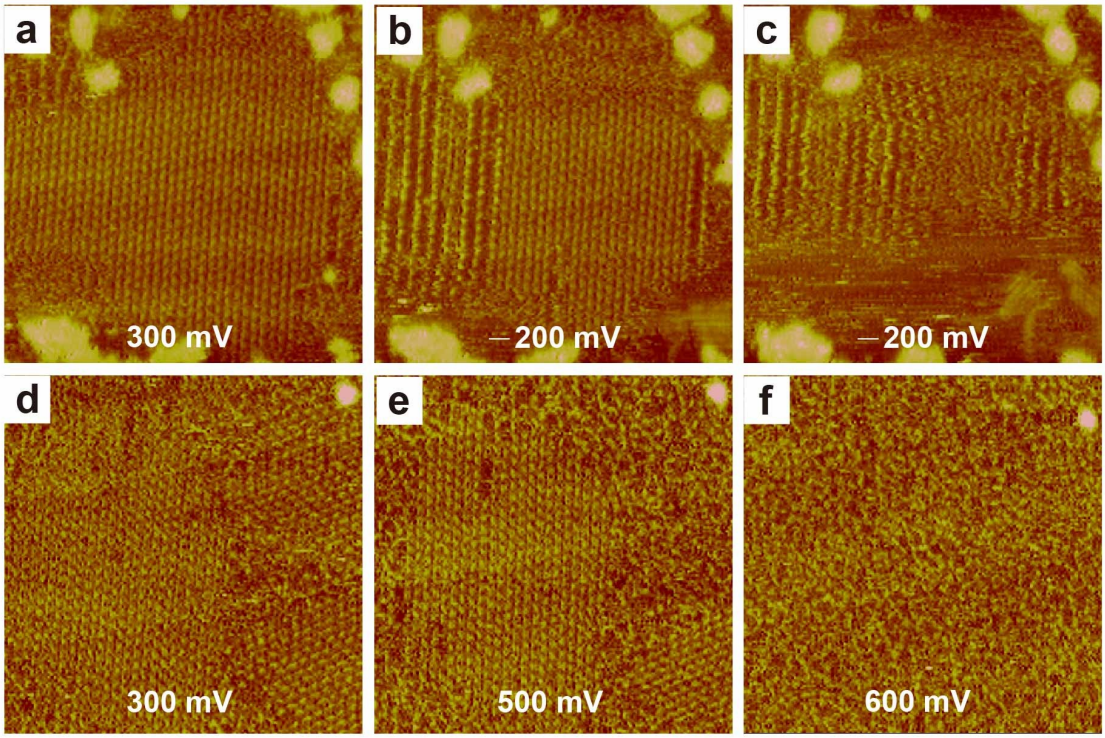

Figure S1. Series STM images of DDBDT rhombus structures on Au(111) surface at different potentials. Image conditions: (a) Scan area = 43 × 43 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (b – c) Scan area = 43 × 43 nm^2, E_{bias} = −1030 mV, I_t = 1.000 nA; (d) Scan area = 42 × 42 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (e – f) Scan area = 42 × 42 nm^2, E_{bias} = −529 mV, I_t = 1.000 nA.

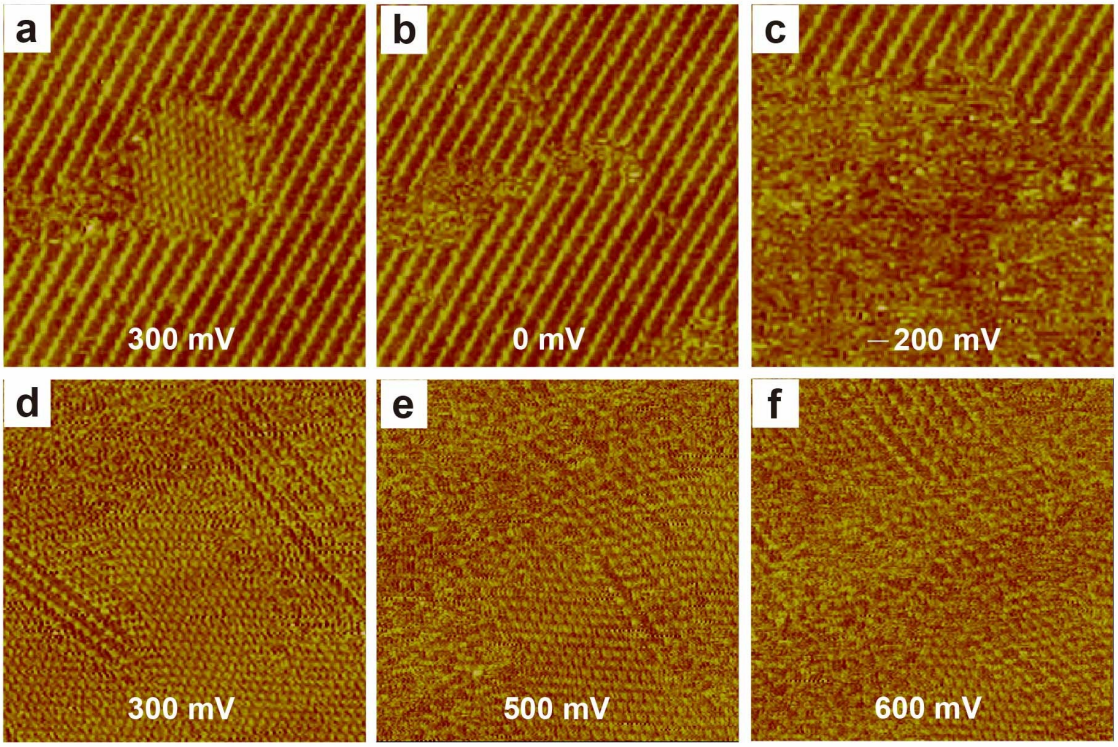

Figure S2. Series STM images of DDBDT two phase adlayer on Au(111) surface at different potentials. Image conditions: (a) Scan area = 32 × 32 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (b – c) Scan area = 32 × 32 nm^2, E_{bias} = −771 mV, I_t = 1.000 nA; (d) Scan area = 42 × 42 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (e – f) Scan area = 42 × 42 nm^2, E_{bias} = −404 mV, I_t = 1.000 nA.

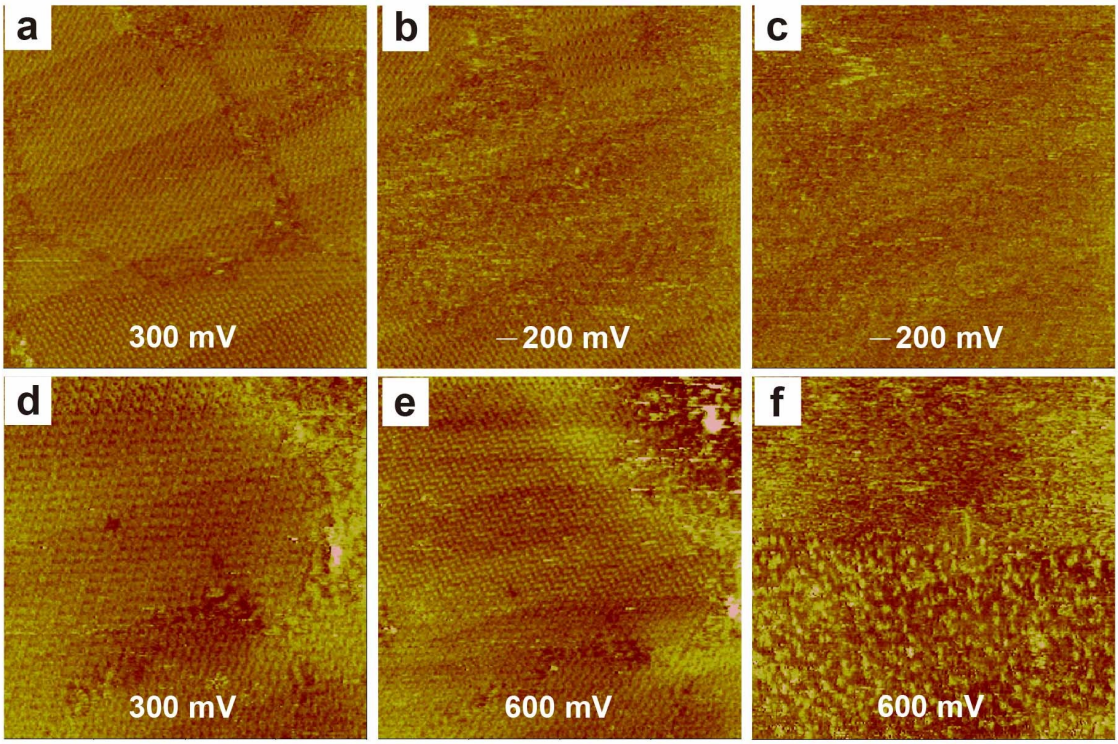

Figure S3. Series STM images of DDBDT herringbone structure on Au(111) surface at different potentials. Image conditions: (a) Scan area = 46 × 46 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (b – c) Scan area = 46 × 46 nm^2, E_{bias} = −422 mV, I_t = 1.000 nA; (d) Scan area = 42 × 42 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (e – f) Scan area = 42 × 42 nm^2, E_{bias} = −525 mV, I_t = 1.000 nA.

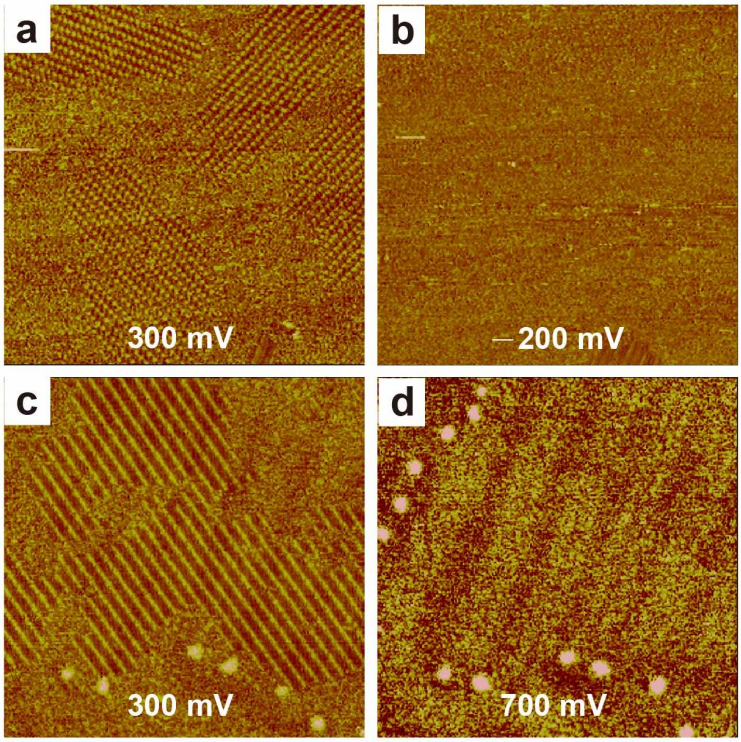

Figure S4. Series STM images of DDBDT lamellar structures on Au(111) surface at different potentials. Image conditions: (a) Scan area = 78×78 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (b) Scan area = 78×78 nm^2, E_{bias} = −240 mV, I_t = 1.000 nA; (c) Scan area = 56×56 nm^2, E_{bias} = −200 mV, I_t = 1.000 nA; (d) Scan area = 56×56 nm^2, E_{bias} = −1050 mV, I_t = 1.000 nA.

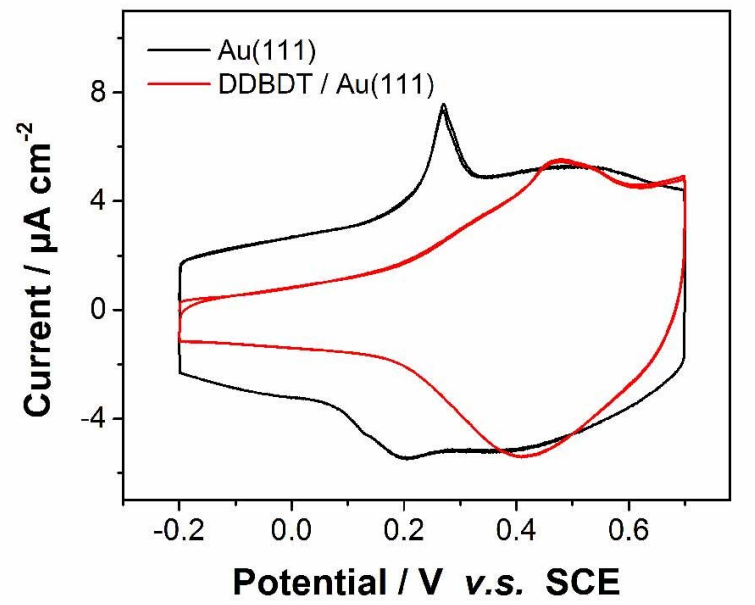

Figure S5. (a) Typical cyclic voltammograms of Au(111) electrode in 0.1 M $HClO_4$ before (black line) and after (red line) the addition of 10^{-5} M DDBDT. Scan rate is 50 mV/s.

Figure S5 displays typical cyclic voltammograms (CVs) of bare (black line), DDBDT adlayer (red line) modified Au(111) electrodes in 0.1 M $HClO_4$ recorded at the scan rate of 50 mV/s. The voltammogram for bare Au(111) electrode in the double-layer potential region is identical to previous reports[1, 2]. A pair of redox peak around 0.30 V can be observed, which is referred to the lift of the $(22\times\sqrt{3})$ reconstruction of Au(111) surface. For the DDBDT modified Au(111) electrode, the double-layer charging current decrease obviously, which indicating the adsorption of DDBDT adlayer (red line). The DDBDT adlayer is stable in the featureless double-layer charging region between -0.2 and 0.2 V. Reversible oxidative and reductive peaks can be distinguished at *ca.* 440 mV, which indicate that redox reactions happened at this substrate potential.

References

1. H. Honbo, S. Sugawara and K. Itaya, *Anal. Chem.*, 1990, **62**, 2424.

2. H. Angerstein-Kozlowska, B. E. Conway, A. Hamelin and L. Stoicoviciu, *J. Electroanal. Chem. Interfacial Electrochem.*, 1987, **228**, 429.