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Long-range dynamic perylene ordering on Ag(110)

We present a room temperature STM study of dynamics of the quasi-liquid perylene monolayer formed on Ag(110) under thermal equilibrium. We observe that the thermodynamic balance of the molecule-molecule and molecule-substrate interactions generate a compact two-dimensional (2D) quasi-liquid state established by the mobile perylene molecules dynamically distributed into three distinct motion modes. The substrate provides memory to the intermingled molecules and eliminates ergodicity of the quasi-liquid state. Fourier transform of the topographies unravels the long-range spatial correlations and epitaxial character of the quasi-liquid state. Analysis of the molecularly resolved motion modes in real space indicates that the substrate force field induces the dynamical ergodic –non-ergodic phase transition which gives rise to the stationary long-range ordered (-1 2.5 3 2) quasi-liquid state.

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