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Chirality Recognition and Transition Mechanism of prochiral Molecules on metals[1] YELIANG WANG, BING YANG, HUANYAO CUN, NAN JIANG, SHIXUAN DU, HONG-JUN GAO, Institute of Physics, Chinese Academy of Sciences, Beijing100190, China, K-H ERNST COLLABORATION[2], YUE WANG COLLABORATION[3]
— The self-assemble behavior of prochiral species and the induced high-order chirality by 2D confinement on solid surfaces, including (1) QA16C molecules on a Au(111) surface and (2) molecule-metallic (TPA-Fe) complex on Cu(110) as well as their transferring process will be presented. Initial stages of a chiral phase transition in the molecule monolayer on metal surfaces were investigated by scanning tunneling microscopy (STM) at submolecular resolution. The prochiral QA16C molecules form a homochiral lamella phase at low coverages upon adsorption. A transition to a racemate lattice is observed with increasing coverage. Enantiomers of a homochiral lamella line become specifically substituted by opposite enantiomers such that a heterochiral structure evolves. A "chiral replacement" model is proposed for the transition: enantiomers replace QA molecules in enantiopure phase, leading to racemic one. Our findings are significant for the understanding and control of chiral phase transitions in related molecular systems like liquid crystals.

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