高角度ツイスト WTe_2 における疑一次元モアレの観測

Quasi-one-dimensional moiré in large-angle twisted bilayer WTe_2

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Moiré effects in two-dimensional twisted bilayer systems are attracting great interests owing to the emergence of novel electronic structures and physical properties. Studies of moiré effects are, so far, mostly conducted at small twist angles, because the increase of twist angle quickly suppresses the size of moiré pattern caused by lattice. Here, we report an experimental discovery of quasi-one-dimensional (1D) moiré patterns in twisted bilayer tungsten ditelluride (tB-WTe_2) with large twist angles of 58° and 62°. Interestingly, the two quasi-1D moiré patterns at 58° and 62° are orthogonal to each other. We further elucidated the transformation between two quasi-1D moiré patterns through an intermediate 2D moiré pattern at 60°. Our results propose tB-WTe_2 as a novel platform for studying one-dimensional physics.

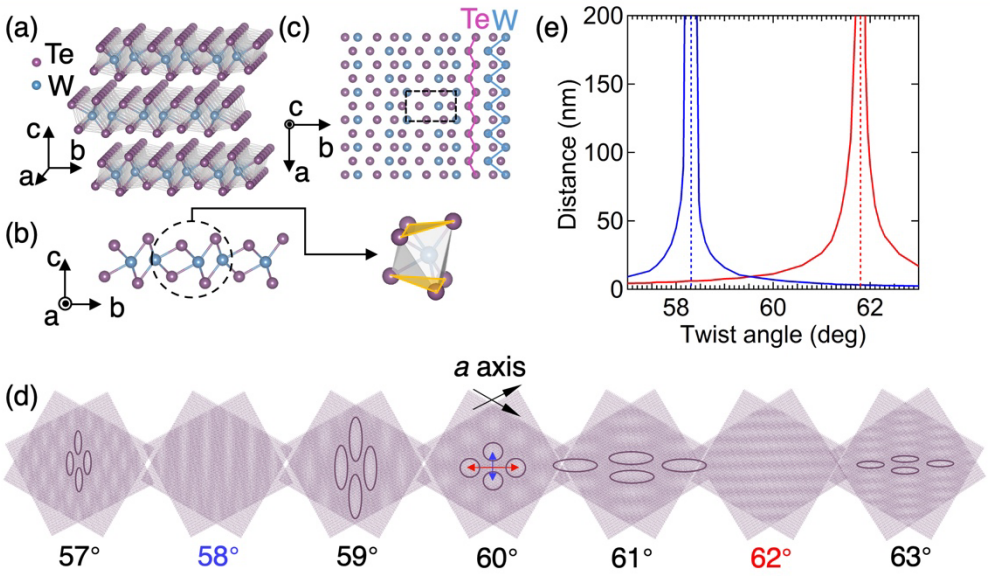

Figure 1. Schematics of WTe_2 and twisted bilayer WTe_2. (a) Crystal structures of T_d phase bulk WTe_2. (b) Side view of monolayer WTe_2. (c) Top view of monolayer WTe_2. The dashed rectangle indicates the unit cell. (d) Schematics of twisted bilayer WTe_2 with twist angles ranging from 57° to 63°. The solid circles indicate the pale regions. Red and blue arrows indicate the lateral and vertical distance of adjacent pale regions, respectively. (e) Relationship between twist angle and the distance of adjacent pale regions.