Supplementary Materials of "Observation of charge density wave in layered hexagonal $Cu_{1.89}Te$ single crystal"

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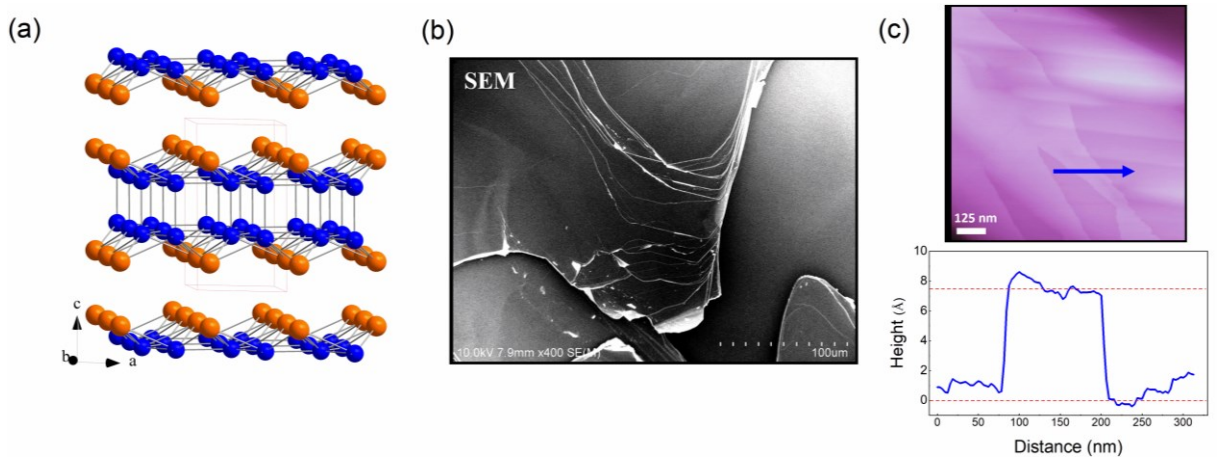


Figure.S1(a)The Nowotny hexagonal layered structure of $Cu_{1.89}Te$. (b) The Typical Scanning electron micrograph of $Cu_{1.89}Te$. (c)The typical AFM image and interlayer height of $Cu_{1.89}Te$.

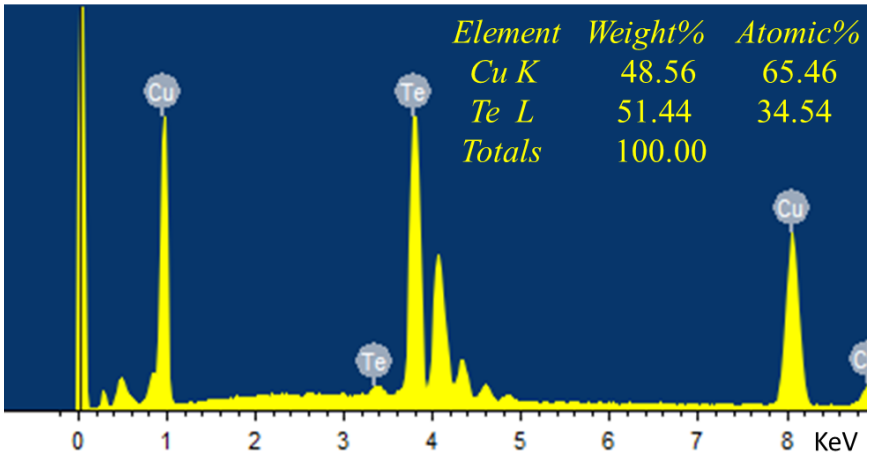
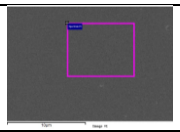
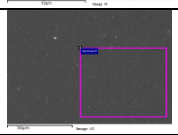
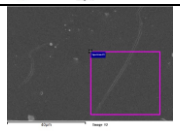
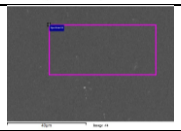
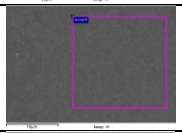
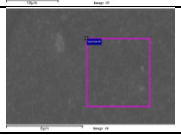


Figure.S2. The Energy Dispersive Spectroscopy (EDS) of $Cu_{1.89}Te$.

TABLE I. The EDS results for different $Cu_{2-x}Te$ samples from the same batch.

Spectra	Atomic Ratio		stoichiometric ratio	SEM
#1	Cu Te	65.28% 34.72%	$Cu_{1.88}Te$	
#2	Cu Te	65.75% 34.25%	$Cu_{1.92}Te$	
#3	Cu Te	65.41% 34.59%	$Cu_{1.89}Te$	
#4	Cu Te	65.16% 34.84%	$Cu_{1.87}Te$	
#5	Cu Te	65.26% 34.74%	$Cu_{1.88}Te$	
#6	Cu Te	65.52% 34.48%	$Cu_{1.90}Te$	
Average	Cu Te	65.46% 34.54%	$Cu_{1.89}Te$	

The stoichiometric ratio of $Cu_{2-x}Te$ is identified to be $Cu_{1.89}Te$ (x=0.11) using Energy Dispersive Spectroscopy (EDS). The EDS was carried on a focused ion beam dual beam system (Helios Nanolab600i, FEI Inc.) equipped with the Oxford X-MAX electron spectrometer. To further minimize the errors, we measured different samples from the same batch and averaged the stoichiometric ratio, as shown in the follow Table I. The stoichiometric ratio of $Cu_{2-x}Te$ is identified to be $Cu_{1.89}Te$ (x=0.11). We also found that all the samples are close to the average stoichiometric ratio, indicting the good uniformity of the samples. Besides, we have

measured the temperature-dependent resistance of different $Cu_{2-x}Te$ samples and the results were shown in Fig.2(a) in the text. Each R-T curve exhibits metallic behavior with unusual upturn kinks at the same temperatures, accompanied with a considerable hysteresis. The transport experiment results further confirmed the uniformity of the samples.

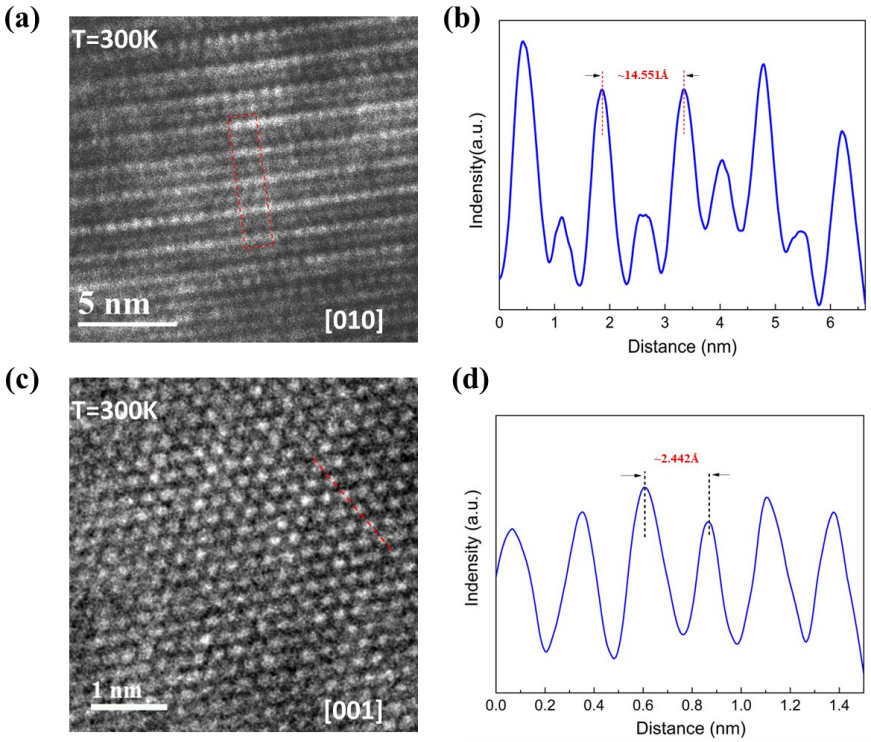


Figure.S3. The High-resolution transmission electron microscopy of $Cu_{1.89}Te$ at T=300K. (a) and (c) TEM image of $Cu_{1.89}Te$ along [010] and [001] directions. (b) and (d)Vertical Scan profiles obtained along red dotted lines from image (a) and image (c). (b) give the reconstruction lateral distance, estimated at about $2c_0 \approx 1.455$ nm, in comparison to the lattice parameter of c_0=0.724nm of Nowotny hexagonal structure. (d) give the distance between nearest neighbor atoms, estimated at about $a_0 \approx 0.244$ nm for Nowotny hexagonal structure.