

TOKUMOTO LAB.

Novel Van der Waals Layered Materials



Department of Materials and Environmental Science

Structural Ordering Materials Science

Department of Materials Engineering, Graduate School of Engineering

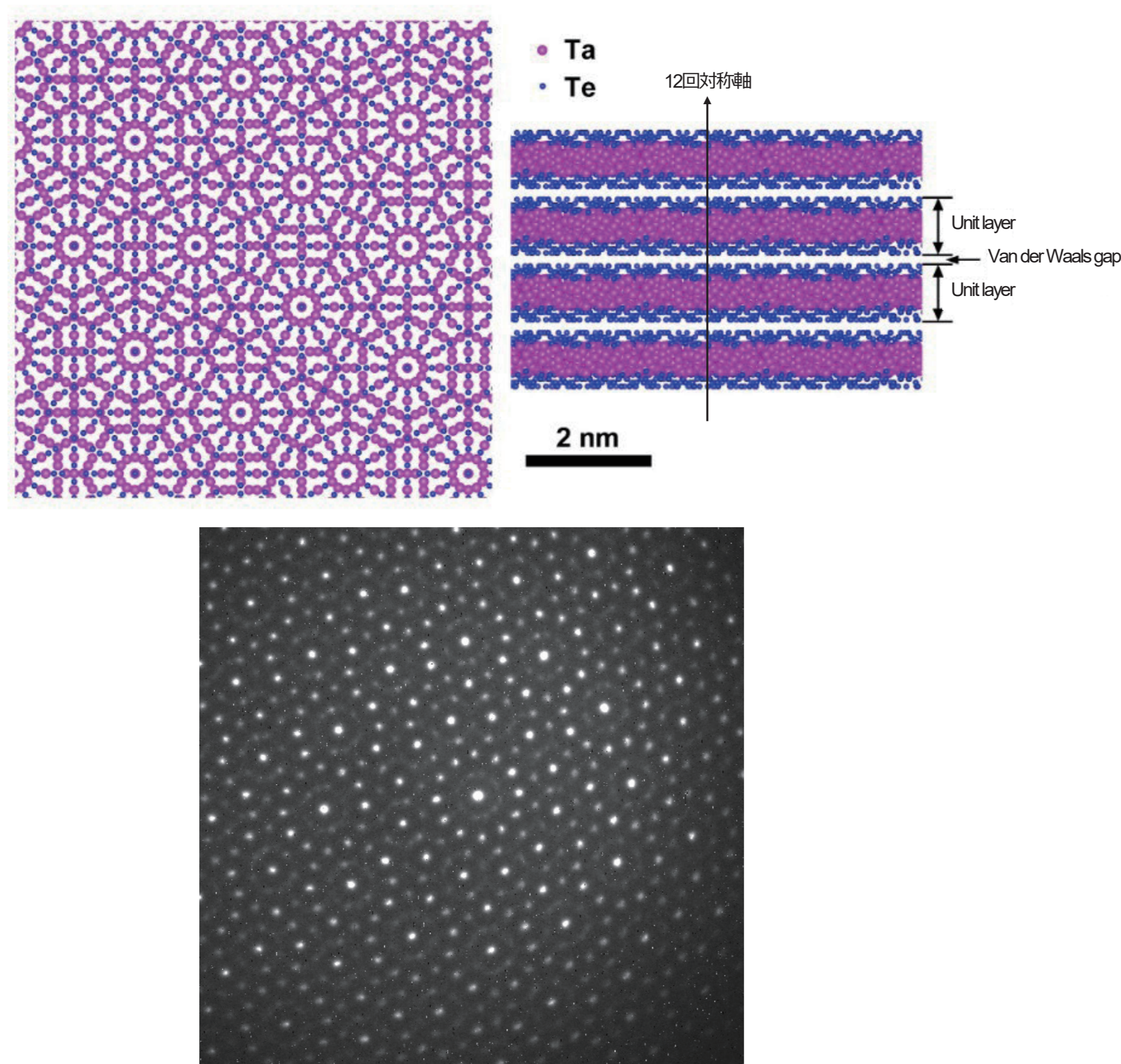
<http://www.tokumoto.iis.u-tokyo.ac.jp>

Structural order and physical properties of solid materials

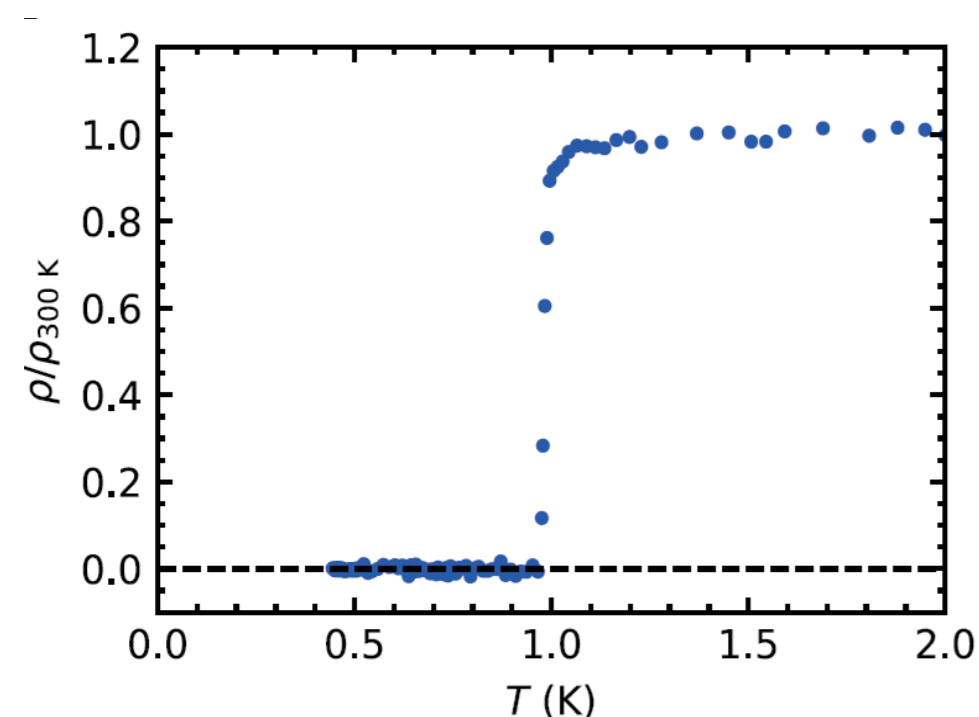
How is the structural order (periodic or quasiperiodic) of solid materials reflected in their physical properties? Our research is primarily focused on the electronic and thermal properties of metals, semimetals, and semiconductors with the aim of clarifying the correlation between structural order and physical properties.

◆ Superconductivity in quasicrystals

Ta-Te dodecagonal quasicrystal :
The only van der Waals quasicrystal to date

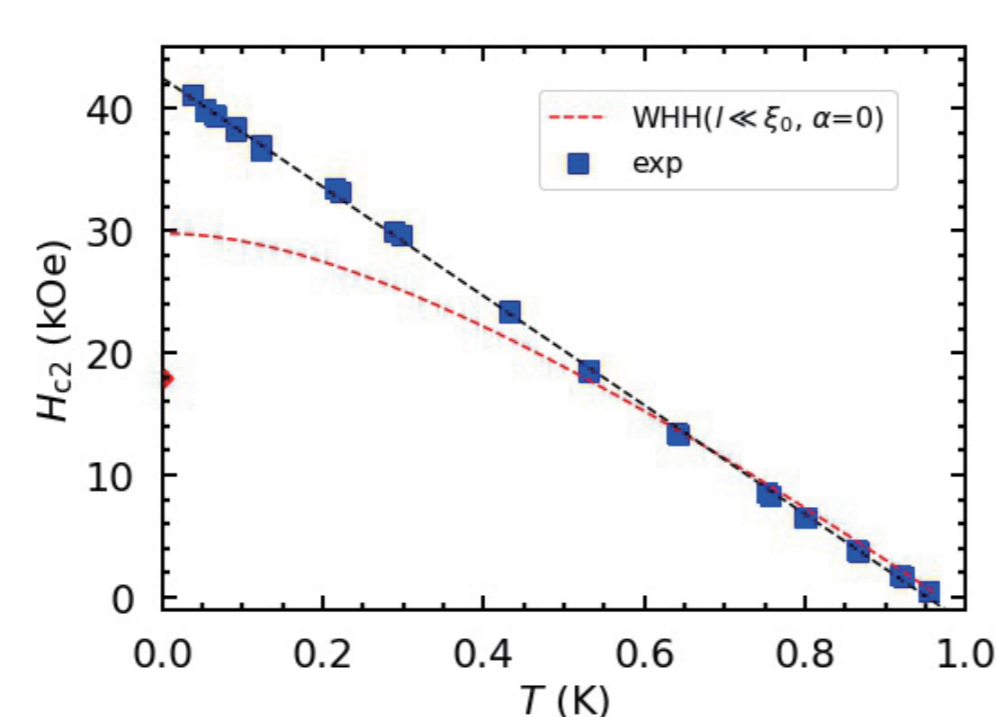


The second example of superconducting quasicrystal



Discovery of bulk superconductivity with $T_c \approx 1\text{K}$

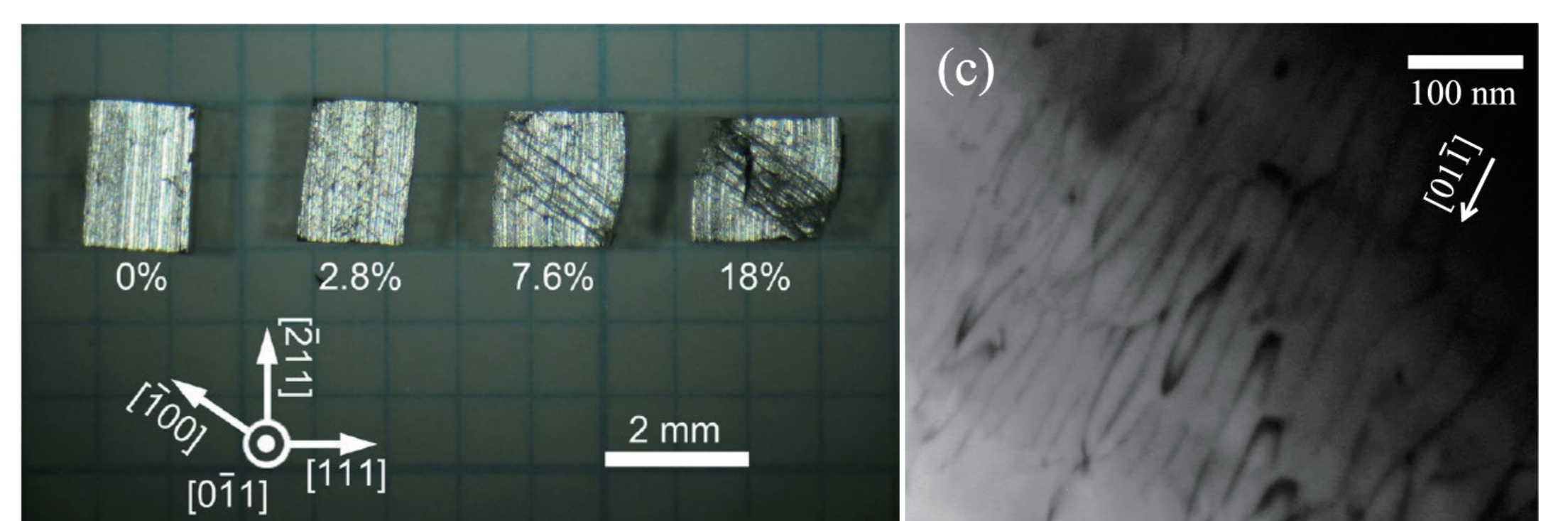
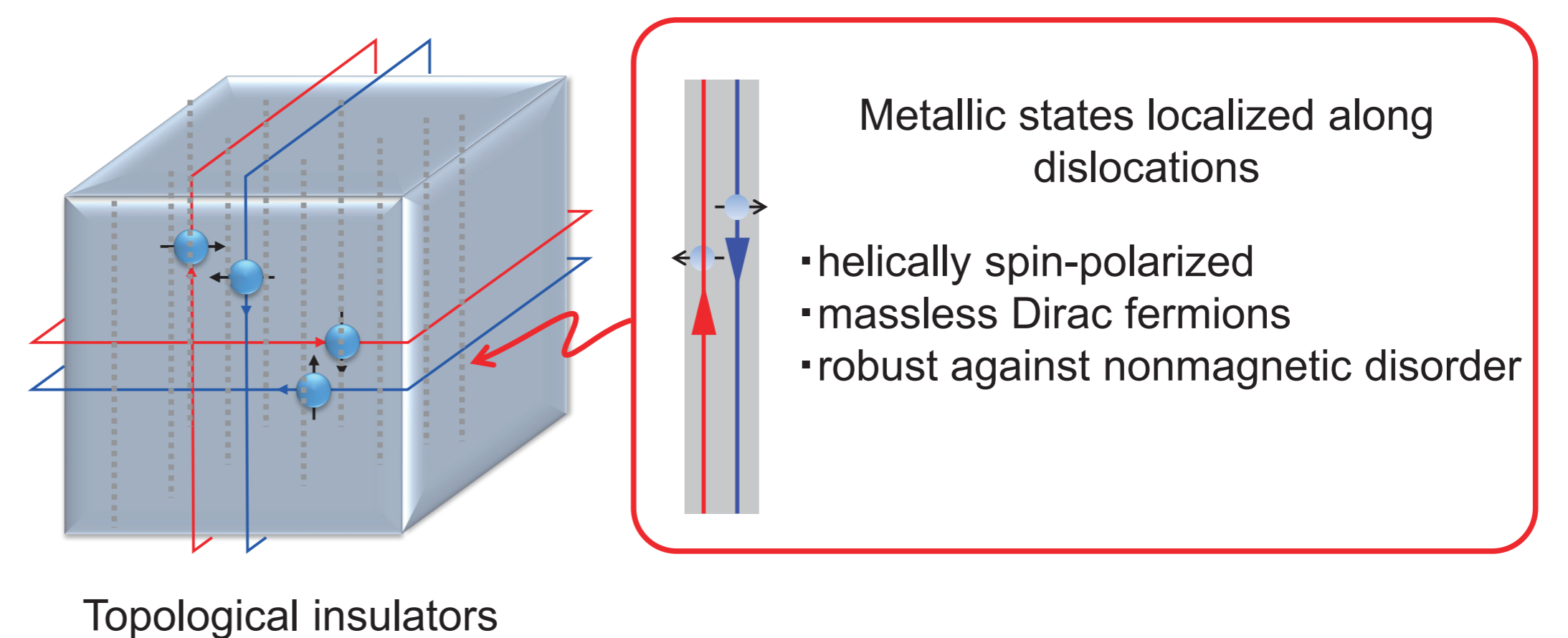
Nat. Commun. (2024)



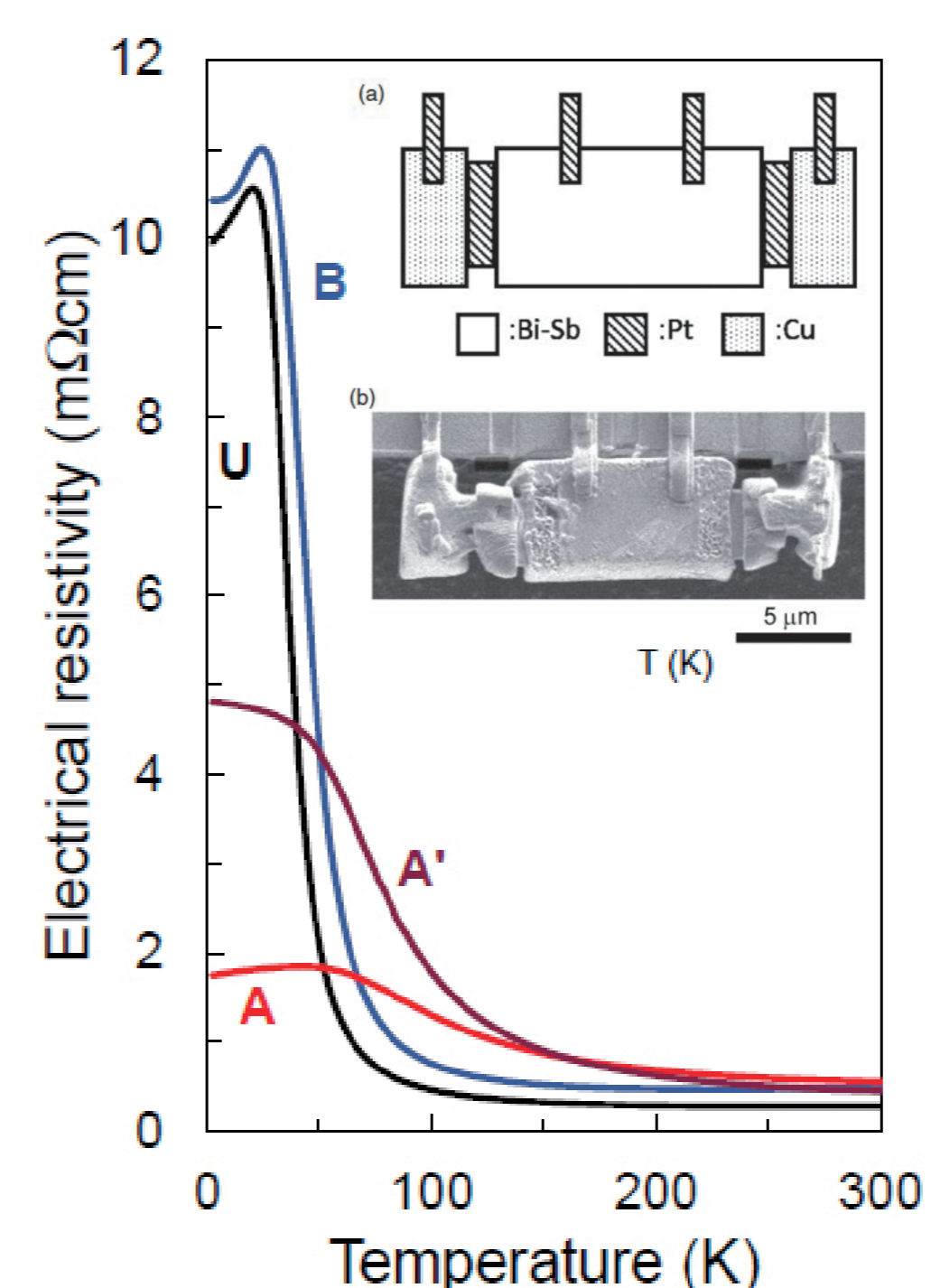
Anomalous behavior of upper critical field

npj Quantum Mater. (2024)

◆ Physical properties of dislocations



Dislocations introduced by plastic deformation



Experimental verification of metallic electrical conduction along dislocations

Appl. Phys. Lett. (2017)
J. Phys. Soc. Jpn. (2020)