Interface-induced superconductivity in magnetic topological insulators

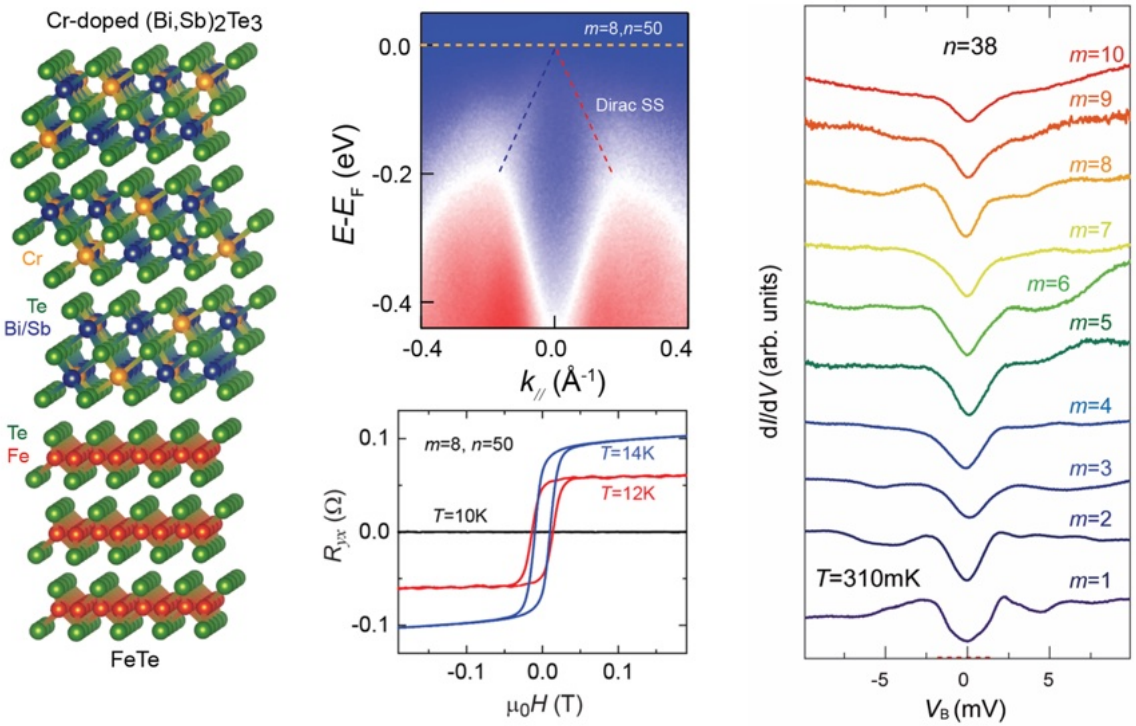
Nitin Samarth, Xiaodong Xu (UW), Weida Wu (Rutgers), Chao-Xing Liu, and Cui-Zu Chang

An IRG1 team employed molecular beam epitaxy to synthesize heterostructures stacking a ferromagnetic topological insulator with a quantum anomalous Hall state, Cr-doped (Bi, Sb)$_2$Te$_3$, and an antiferromagnetic iron chalcogenide, FeTe, with an atomically sharp interface. An unexpected phenomenon emerges: interface-induced superconductivity.

Electrical transport, reflective magnetic circular dichroism, magnetic force microscopy, and angle-resolved photoemission spectroscopy demonstrate the coexistence of superconductivity, ferromagnetism, and topological band structure.

These QAH/FeTe heterostructures with robust interface-induced superconductivity provide an ideal platform for the exploration of chiral topological superconductivity and Majorana physics and thus constitute an important step toward scalable topological quantum computation.

Yi et al., *Science* **383**, 634 (2024)



Left: MBE-grown Cr-doped (Bi,Sb)$_2$Te$_3$/FeTe heterostructures

Middle, right: Coexistence of superconductivity, ferromagnetism, and topological order. STM measurements confirm a superconducting proximity effect.