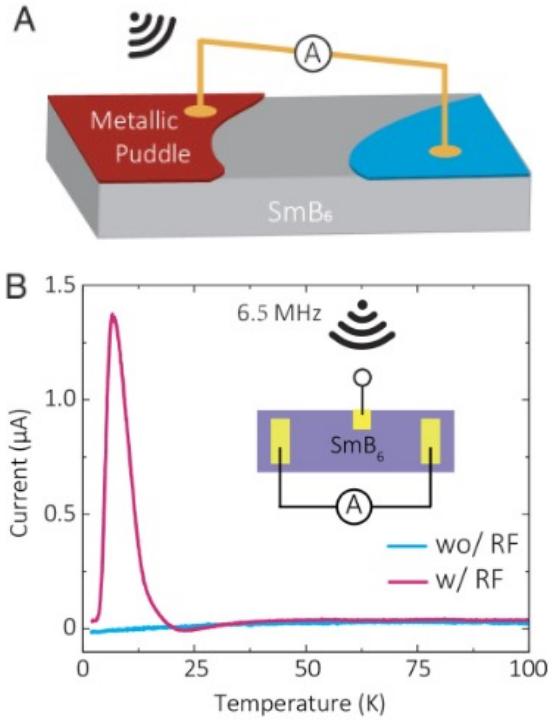
Realizing a Topological Diode Effect on the Surface of a Topological Kondo Insulator



(A) Illustration of metallic surface puddles forming out of the insulating bulk states of SmB_6. (B) Rectification current measured by the two-contact method. A -20 dBm 6.5 MHz RF signal was applied to the sample through a third electrode.

Scientific Achievement

Rectification effects (conversion rf modulation into dc currents) are realized on the surface of SmB_6, a topological Kondo insulator.

Significance and Impact

Introducing the concept of topology to the field of microelectronics holds the potential for optoelectronic applications at low temperatures.

Research Details

- The team synthesized high-quality SmB_6 crystals, a three-dimensional topological insulator driven by strong electronic correlations.
- Electrical current was measurement as a function of temperature, rf frequency, doping level, and contact configuration.
- Diode and rectification effects were observed and attributed to pn junctions created from spatial inhomogeneities that break mirror symmetry on the surface.

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