

Katharina J. Franke

Freie Universität Berlin, Germany

Is there a superconducting one-way road? - Directing the current through superconducting junctions with single magnetic atoms

The diode is one of the most important components in electronic devices. Diodes allow current to pass in one direction while blocking the other direction. Typically, they are made of semiconducting materials. Superconductors can carry current without resistance. Ideal diode behavior could be envisioned if current could flow without resistance in one direction, while being strongly dissipative in the reverse direction. Thus, a superconducting diode would essentially allow for unlimited resistance ratios.

The miniaturization of electronic devices also demands for ever smaller diodes. Here, we fabricate atomic-scale junctions of superconductors in a scanning tunneling microscope. When we insert a single magnetic atom into the junction, we observe diode behavior.

Katharina Franke is a professor for experimental physics at Freie Universität Berlin, Germany. Her group investigates electronic and magnetic properties of single atoms, molecules and nanostructures at surfaces by scanning tunneling microscopy and spectroscopy at low temperatures. One of the major goals is to understand the interplay of magnetic adsorbates with superconducting substrates.

