The Hall effect in the organic conductor TTF–TCNQ: choice of geometry for accurate measurements of a highly anisotropic system

We have measured the Hall effect on recently synthesized single crystals of the quasi-one-dimensional organic conductor TTF–TCNQ (tetrathiafulvalene–tetracyanoquinodimethane), a well known charge transfer complex that has two kinds of conductive stacks: the donor (TTF) and the acceptor (TCNQ) chains. The measurements were performed in the temperature interval 30 K < T < 300 K and for several different magnetic field and current directions through the crystal. By applying the equivalent isotropic sample approach, we have demonstrated the importance of the choice of optimal geometry for accurate Hall effect measurements. Our results show, contrary to past belief, that the Hall coefficient does not depend on the geometry of measurements and that the Hall coefficient value is approximately zero in the high temperature region (T > 150 K), implying that there is no dominance of either the TTF or the TCNQ chain. At lower temperatures our measurements clearly prove that all three phase transitions of TTF–TCNQ could be identified from Hall effect measurements.
