

Chiral Metals from Chiral Donors or Chiral Anions

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The use of chiral donors,¹ chiral anions,² and/or chiral solvents³ provides multiple routes to towards the synthesis of single crystals of chiral molecular metals. Multifunctional materials combining chirality with conductivity are not found in nature and the synthesis of such materials has been a hotly pursued topic since the discovery of electrical magneto-chiral anisotropy (eMChA).⁴

We recently reported the synthesis of a chiral molecular metal, θ -(**1**)₄TCNQ,¹ which remains metallic down to at least 4.2K. This salt also exhibits room-temperature switching capabilities with a transition from insulating to metallic state upon cooling below 10°C.

We also recently reported κ -BDH-TTP₂[B₅(S-chloromandellate)₂], the first enantiopure radical-cation salt of BDH-TTP.² The spiroboronate anions pack in a novel double anion layer which is the thickest anion layer found in a BDH-TTP salt. This salt is a chiral metal from room temperature down to 4.2K. Spiroboronate anions can have multiple chiral centres on the same anion - on each chiral ligand as well as the boron centre. We have observed chiral crystallisation where only certain enantiomers crystallise with the donor despite a racemic anion mixture being present in solution.

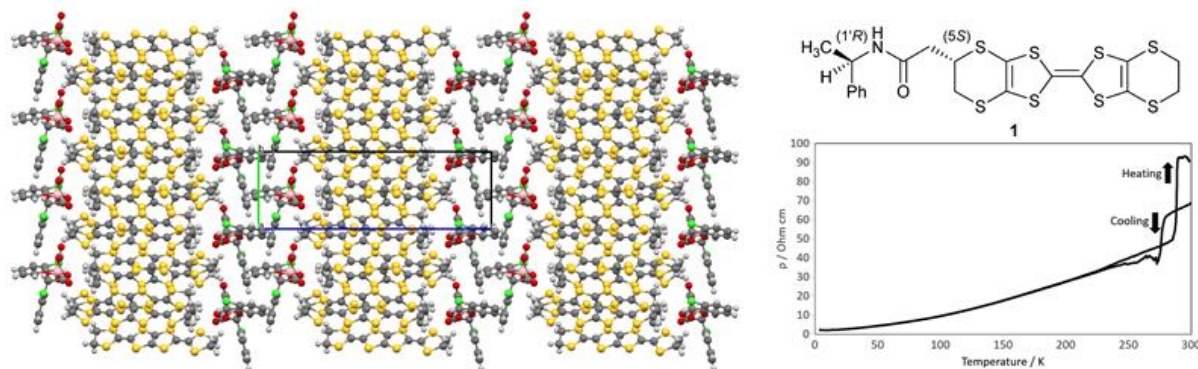


Fig. 1. κ -BDH-TTP₂[B₅(S-chloromandellate)₂] (left).
New chiral donor molecule (**1**), and electrical resistivity of θ -(**1**)₄TCNQ (right).

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