Development of crystalline nano-wires made of supramolecular conductors

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One-dimensional stacking columns of TTF (tetrathiafulvalene) derivatives are divided into independent nano-wires in the crystal by using supramolecular assemblies as insulating partitions. The supramolecular assemblies comprise halide anions and tetraiodoethylene connected to each other by halogen bonds. The semiconductive behavior of the nano-wire crystals is interpreted on the concept of resists array containing defects, which gives good explanation the temperature dependence behavior and anisotropy of the resistivity measurement.

Several new nano-wire materials are also successfully prepared by using MDT-TTF (methylenedithio- tetrathiafulvalene) or TSeF (tetraselenafulvalene). In case of TSeF salt, the thickness of the insulating layer material is considerably increased by means of HFTIEB (hexafluoro-tetrakis(iodoethynyl)-biphenyl). It enables excellent insulation between nano-wires that is critical electric property in the practical use of nano-wires.