

Conducting bilayer salts (CNB-EDT-TTF)4A

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During the last few years a new paradigm of 2D conductors based on molecular bilayers, rather than on single layers, has emerged in a series of charge transfer salts based on the organic donor CNB-EDT-TTF (5-cyanobenzene-ethylenedithio-tetrathiafulvalene)[1], with different small anions A ($I3^-$, ClO_4^- , BF_4^- , ReO_4^- , PF_6^- and SbF_6^- , AsF_6^- , AuI_2^- , I_2Br^- , etc...), with general formula (CNB-EDT-TTF) $_4$ A which has been reported by our group.[2-8] A common structural feature of this series of compounds is the head-to-head arrangement of the donors, induced by a network of weak $C\equiv N\cdots H-C$ interactions, which can be described as an effective combination of R22(10) and R24(10) synthons, forming donor bilayers alternating with anionic layers. This series of layered compounds is characterized by a so far unique arrangement of partially oxidized donors in bilayers with interesting two-dimensional metallic or even superconducting properties. They present a rich diversity of polymorphs with different origins: i) different layer packing patterns of donors; ii) alternating or uniform arrangement of donors tilting between successive bilayers; iii) distinct anionic lattices and possible anion ordering schemes. The contribution of the different possible anion layer and interlayer ordering schemes to the structural variations observed will be presented together with their physical properties.

References

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Primary authors: RABACA, Sandra; C. SANTOS, Isabel (C2TN, DECN, Instituto Superior Técnico, Universidade de Lisboa, Portugal); B. LOPES, Elsa (C2TN, DECN, Instituto Superior Técnico, Universidade de Lisboa, Portugal); GAMA, Vasco (C2TN, DECN, Instituto Superior Técnico, Universidade de Lisboa, Portugal,); F. VEIROS, Luís (C2TN, DECN, Instituto Superior Técnico, Universidade de Lisboa, Portugal); NOGUEIRA, Fernando (CFisUC, Departamento de Física, Universidade de Coimbra, Coimbra, Portugal); A. PAIXÃO, José (CFisUC, Departamento de Física, Universidade de Coimbra, Coimbra, Portugal); ALMEIDA, Manuel (C2TN, DECN, Instituto Superior Técnico, Universidade de Lisboa, Portugal)

Presenter: RABACA, Sandra

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