

Structure and Properties of Hybrid *o*-Me₂TTF Salts Containing Polyoxometalate and Hexacyanometalate Anions

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While many salts displaying varying levels of conductivity and different physical properties have been prepared using various TTF and TSF-type derivatives, one derivative which has seen limited study and use in the preparation of hybrid materials is the donor *o*-Me₂TTF (*o*-Me₂TTF = *o*-4,4'-dimethyltetrathiafulvalene). This donor, whose preparative procedure was first described in 1988, was used to prepare the insulating salt (*o*-Me₂TTF)[ReO₄] in 1993 [1,2]. Recently, we described the structure and properties of a series of 1-D organic metals utilizing *o*-Me₂TTF with the formula (*o*-Me₂TTF)₂[X] (X = Cl⁻, Br⁻, and I⁻) as well as the salt (*o*-Me₂TTF)[I₃], another example of a strong insulating salt dominated, much like the [ReO₄]⁻ salt, by strong σ -type overlap between singly occupied molecular orbitals of *o*-Me₂TTF radical cations [3,4]. These examples all illustrate the potential utility which *o*-Me₂TTF could have for the preparation of new materials containing inorganic anions of different geometries.

In order to assess the potential use of *o*-Me₂TTF in the preparation of hybrid materials and to evaluate these materials' properties, we have successfully prepared salts with the diamagnetic anions [Mo₆O₁₉]²⁻, [W₆O₁₉]²⁻, [PW₁₂O₄₀]³⁻, and [Co(CN)₆]³⁻. A salt has also been prepared with the low spin, paramagnetic [Fe^{III}(CN)₆]³⁻ anion. The structures, band dispersion diagrams, conductivity levels, and magnetic properties for all salts will be presented.

[1] Lerstrup, K.; Johannsen, I.; Jørgensen, M. *Synth. Met.*, **1988**, 27, 9.

[2] Mhanni, A.; Ouahab, L.; Grandjean, D.; Amoroux, J., Fabre, J.M. *Acta Cryst.*, **1993**, C49, 1187.

[3] Fourmigué, M; Reinheimer, E.W.; Dunbar, K.R.; Auban-Senzier, P.; Pasquier, C.; Coulon, C. *Dalton Trans.*, **2008**, (34), 4652.

[4] Reinheimer, E.W.; Fourmigué, M; Dunbar, K.R. *J. Chem. Cryst.*, In Press.