

## Novel Organic Conductors Based on DMEDO-TSeF and Related TSeF Derivatives

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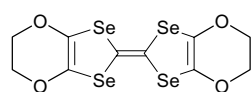
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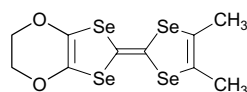
Recently, we have reported the synthesis and properties of eight new ambient pressure organic superconductors  $\kappa$ -(DMEDO-TSeF)<sub>2</sub>[Au(CN)<sub>4</sub>](cyclic ether) [1-2], where DMEDO-TSeF is a hybrid molecule between BEDO-TSeF [3] and TMTSF, and it is also an analogue of DMET, which has provided many superconductors. Based on the successful development of the new superconductors, we have started a systematic survey of related materials using two different approaches.

The first one is search for new  $\kappa$ -type salts of DMEDO-TSeF comprising other solvents of crystallization, both protic and aprotic. For instance, hexagonal plate crystals were harvested from the electrochemical oxidation of a ethanol solution containing DMEDO-TSeF and TBA·Au(CN)<sub>4</sub>. The poor quality of the crystal has prevented the detailed structure analysis of the Au(CN)<sub>4</sub>-ethanol layer at present, however, cell parameters and the donor arrangement of the salt are similar to those of the  $\kappa_L$ -salts containing cyclic ether, such as  $\kappa_L$ -(DMEDO-TSeF)<sub>2</sub>[Au(CN)<sub>4</sub>](THF). Measurements of the transport properties and the optimization of the conditions for the electrocrystallization are now in progress.

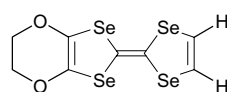
The second approach is a chemical modification of the donor molecule. Inspired by the report on the gigantic photoresponse of (EDO-TTF)<sub>2</sub>PF<sub>6</sub> [4], we have tried to synthesize EDO-TSeF, which is the full-selenated analogue of EDO-TTF. EDO-TSeF could be obtained from a cross-coupling reaction between the corresponding selones. The crystal structure and electrochemical properties of EDO-TSeF will be reported together with the preparation of conducting cation radical salts.



BEDO-TSeF



DMEDO-TSeF



EDO-TSeF



Crystal structure of EDO-TSeF

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[1] T. Shirahata, M. Kibune and T. Imakubo, *Chem. Commun.*, 2006, 1592-1594.

[2] T. Shirahata, M. Kibune, H. Yoshino and T. Imakubo, *Chem. Eur. J.*, 2007, **13**, 7619-7630.

[3] T. Imakubo, T. Shirahata and M. Kibune, *Chem. Commun.*, 2004, 1590-1591.

[4] M. Chollet *et al.*, *Science* 2005, 307, 86-89.