

Crystal structures and physical properties of donor type dithiolene complexes with cycloalkane rings

Kazuya Kubo¹, Akiko Nakao², Takeo Fukunaga¹, Hiroshi M. Yamamoto¹, Reizo Kato¹

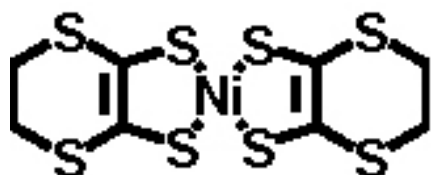
1. RIKEN, 2-1, Hirosawa, Wako-shi, Saitama 351-0198, Japan

2. KEK, 1-1 Oho, Tsukuba, Ibaraki 305-0801, Japan.

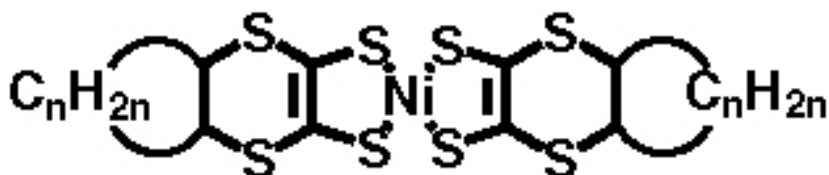
Metal bis-dithiolene complexes have been intensively studied as conducting materials. Among them, acceptor type complexes provide various anion radical salts which exhibit superconducting and metallic behavior. [1] On the other hand, neither a metal nor a superconductor has been obtained from donor type complexes except for a salt of $[\text{Ni}(\text{dddt})_2]$. [2] In this work, we examined modification of the dddt complex with terminal cycloalkane rings, and developed $[\text{Ni}(\text{C}_n\text{-dddt})_2]$ ($n = 3, 4, 5, 6$) to expand the materials chemistry of the donor type complexes. In the crystals of the neutral complexes, the cycloalkane rings exhibited various conformations which would affect physical properties in their cation radical salts. We succeeded in electrochemical crystallization of new cation radical salt $[\text{Ni}(\text{C}_3\text{-dddt})_2]_3(\text{BF}_4)_2$. Other salts were also obtained by similar procedures. We will discuss their electrical property of the salts based on the crystal structure.

[1] R. Kato, *Chem. Rev.*, 104 (2004) 5319.

[2] L. A. Kushch *et al.*, *J. Mater. Chem.*, 5 (1995) 1633.



Ni(dddt)₂



Ni(C_n-dddt)₂: n = 3, 4, 5, 6