

## Hydrogen-Bonding Tetrathiafulvalene (TTF) Conductors: Carrier Generation by Self Doping

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Tetrathiafulvalene (TTF) has been one of the most familiar electron-donating molecules in designing charge-transfer (CT) complex since the first discovery of its conductivity in 1970s [1]. TTF is also known as a proton acceptor due to its proton-accepting ability of the central carbon-carbon double bond. Noteworthy is that, the protonation of TTF by the external addition of Brønsted acid causes generation of radicals in solution via the electron-transfer reaction [2]. This phenomenon is very interesting from viewpoints of not only fundamental chemistry but also development of unprecedented electroactive TTF based materials principally different from CT complexes.

Recently we have found that TTF bearing acidic substituent become hole-doped type conductors upon salt formation with ammonia. The salts generate mobile carriers by self doping without any external acidic additives, being recognized as a novel class of molecular conductors. Obtained crystalline self-doped TTF conductors exhibit anomalous an isotope effect in the electronic conductivity between the protonated and deuterated samples below 200 K, strongly suggesting the correlation between the hydrogen bonds and electronic conduction. Synthesis, characterization and carrier generation mechanism of these novel hydrogen-bonding-assisted self-doped TTF conductors, will be discussed together with the molecular orbital characteristics.

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[2] M. Giffard, P. Alonso, J. Garin, A. Gorgues, T. P. Nguyen, P. Richomme, A. Robert, J. Roncali, S. Uriel, *Adv. Mater.* 6 (1994) 298.