Very-Low-Temperature Heat Capacities and Low-Energy Excitations of Normal and Deuterated Thiophenes

Heat capacity measurements for normal thiophene and deuterated thiophene were performed with relaxation calorimetry at very low temperatures. Mountain-like thermal anomalies with roughly the same height, which correspond to low-energy excitations, were found around 8 K for the metastable phases and around 10 K for the stable phases in both thiophene and deuterated thiophene even though the very-low temperature stable phase of deuterated thiophene is orientationally ordered crystal.

(by Y. Miyazaki)

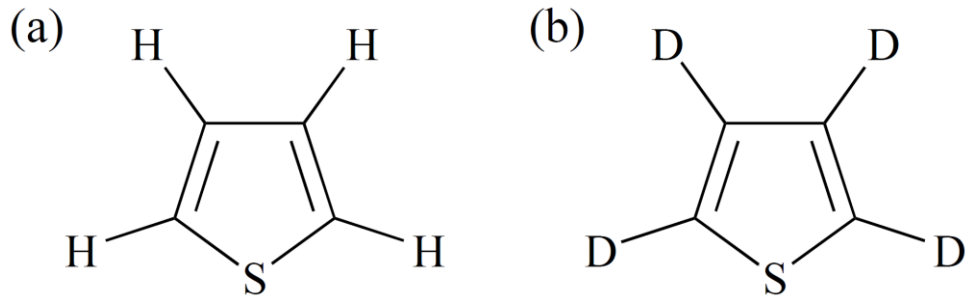

Fig. 1. Molecular structures of (a) normal thiophene and (b) deuterated thiophene.

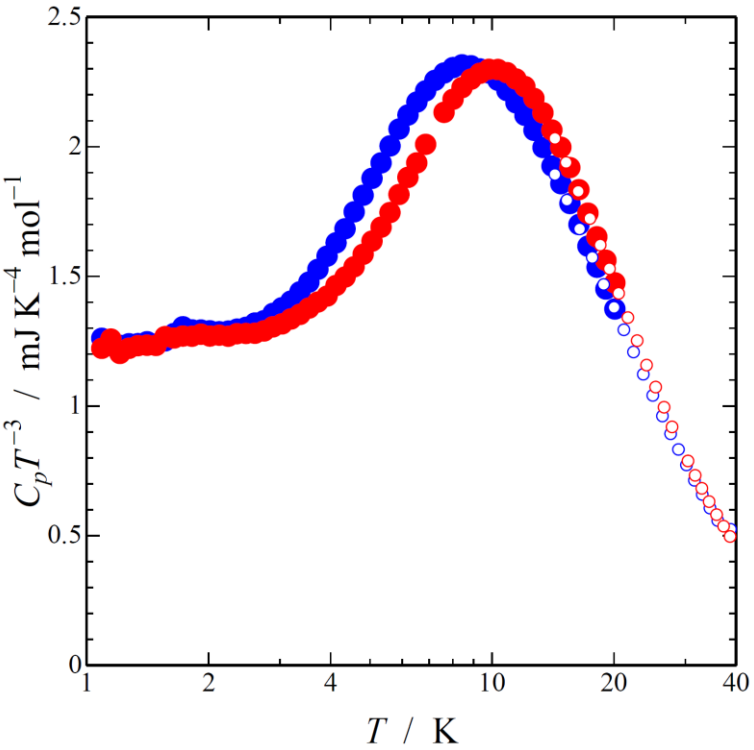

Fig. 2. Very-low-temperature heat capacities of normal thiophene. Solid and open blue circles correspond to the heat capacities of the metastable phases by relaxation calorimetry and adiabatic calorimetry, respectively. Solid and open red circles correspond to the heat capacities of the stable phases by relaxation calorimetry and adiabatic calorimetry, respectively.

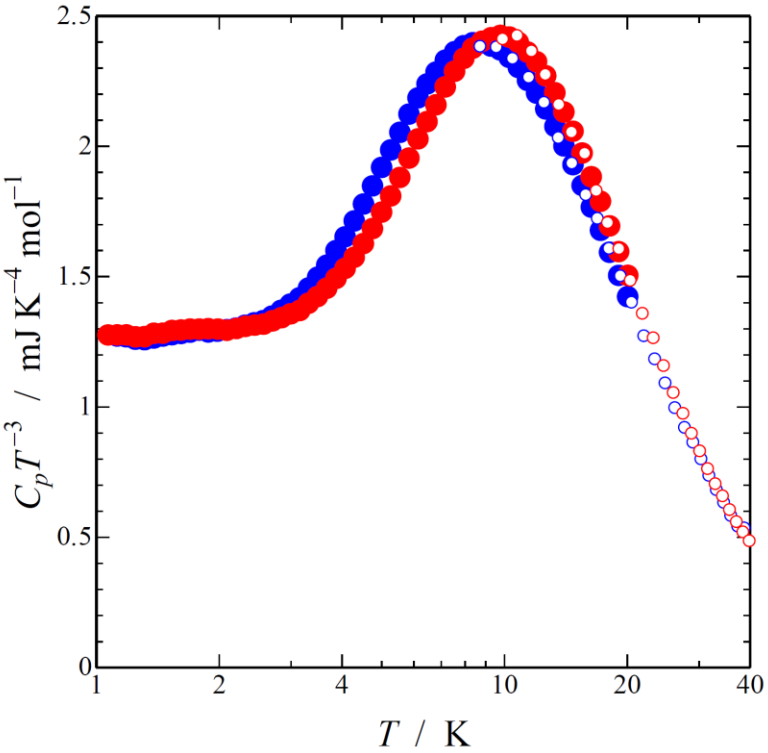

Fig. 3. Very-low-temperature heat capacities of deuterated thiophene. Solid and open blue circles correspond to the heat capacities of the metastable phases by relaxation calorimetry and adiabatic calorimetry, respectively. Solid and open red circles correspond to the heat capacities of the stable phases by relaxation calorimetry and adiabatic calorimetry, respectively.