Novel phase transition in spin frustrated $Et_2Me_2Sb\ [Pd(dmit)_2]_2$ System (LT26)

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A new type of phase transition has been discovered in the $Et_2Me_2Sb[Pd(dmit)_2]_2$ system of organic semiconductors. In this transition, $Pd(dmit)^{2-}$, which has localized magnetic moments s = 1/2, changes into neutral $Pd(dmit)_2^{0-}$ and divalent $Pd(dmit)_2^{2-}$ spinless states. To clarify the mechanism of this novel phase transition accompanied by the charge separation, we have studied the thermal properties of this system. We discovered a broad hump above the critical temperature as well as a sharp peak with small hysteresis in the vicinity of the phase transition. The resulting total entropy ascribed to the transition reaches 13 J/mol-K. It is significantly large and is more than four times larger than the total excess entropy in an α-ET_2I_3 system, that undergoes the charge order transition without a lattice distortion.[1] We concluded that the spin, charge degrees of freedom and lattice modulation cooperatively drive this novel phase transition.

[1]N.A. Fortune, K. Murata, M. Ishibashi , M. Tokumoto , N. Kinoshita, and H. Anzai, Solid State Commun. **79**, 265 (1991).