EPR Study of charge transfer co-crystals of DBTTF:F4TCNQ

Tamar Ben Avraham (1), Enrico Da Como (2), Claudio Fontanes (3), Raanan Carmieli (1)

[1] Department of Chemical and Biological Physics, Weizmann Institute of Science, Rehovot 76100 Israel

[2] Centre for Photonics and Photonic Materials (CPPM) and Department of Physics, University of Bath, BA2 7AY, United Kingdom

[3] DIEF, University of Modena and Reggio Emilia, via Vivarelli 10, 41125 Modena, Italy

e-mail: raanan.carmieli@weizmann.ac.il

Charge transfer crystals exhibit unique electronic and magnetic properties with interesting applications. The charge transfer single crystal formed by dibenzotetrathiafulvalene (DBTTF) together with 2,3,5,6-tetrafluoro-7,7,8,8-tetracyanoquinodimethane (F4TCNQ) presents a long-range ordered supramolecular structure of segregated stacks, with a unitary degree of charge transfer. Thus, the crystal structure is composed of dimerized radical molecules with unpaired electrons. EPR temperature studies of polycrystalline sample revealed that oxidation reduction reaction doesn't occur between every two neighboring molecules but upon charge transfer the electron migrate through the stack from 18.6 Å at 5 K up to 19.42 Å at 300 K. Between 100 to 150 K we observed the shortest distances of 17-16.87 Å suggesting a glass transition behavior in this temperature range.