Raman studies of the charge ordering in organic electronic ferroelectrics $(TMTTF)_2X$ (X = SbF_6, AsF_6, PF_6, ReO_4, ...)

B. Barszcz,[1] R. Świetlik,[1] A. Pustogow,[2] and M. Dressel[2]

[1] *Institute of Molecular Physics, Polish Academy of Sciences, M. Smoluchowskiego 17, 60-179 Poznań, Poland*

[2] *1. Physikalisches Institut, Universität Stuttgart, Pfaffenwaldring 57, D-70569 Stuttgart, Germany*

The organic donor TMTTF (teramethyl-tetrathiafulvalene) and various anions (octahedral: X= Sb_6, AsF_6, PF_6; and tetrahedral: X = ReO_4, ClO_4, BF_4) form one-dimensional 2:1 charge-transfer salts with metallic properties. At low temperatures (T = 64 - 230 K) in these salts a charge ordering (CO) is observed which is mainly due to strong electron-electron correlations. The CO effect is directly related with the so-called electronic ferroelectricity. We studied temperature dependence of Raman spectra of the $(TMTTF)_2X$ salts focusing mainly on the charge sensitive C=C and C-S stretching modes which can be used for evaluation of the charge distribution in conducting TMTTF stacks. The C-S bands of molecules with charge +0.5 are assigned to ferroelectric domains, while the bands of neutral $TMTTF^0$ and fully ionized $TMTTF^+$ molecules to domain walls [1].

References:

[1] R. Świetlik, B. Barszcz, A. Pustogow, M. Dressel, Phys. Rev. B 95, 085205 (2017).