Dielectric properties of charge ordered molecular conductors: looking for electronic ferroelectricity

P. Auban-Senzier¹, C. Pasquier¹, C. Mézière², P. Batail², D. Lorcy³, M. Fourmigué³

¹ Université Paris-Saclay, CNRS, UMR8502, Laboratoire de Physique des Solides, 91405, Orsay, France

e-mail:pascale.senzier@universite-paris-saclay.fr ² MOLTECH-Anjou, CNRS-Université d'Angers, UMR 6200, Bat. K, 49045, Angers, France ³Université de Rennes I, CNRS, ISCR (Institut des Sciences Chimiques de Rennes), UMR 6226, Campus de Beaulieu, 35000 Rennes, France

We have looked for the temperature and frequency dependence of the dielectric response of different molecular conductors, candidates for ferroelectricity, due to their charge ordered (CO) ground state. The complex impedance has been measured with a RLC bridge using a homemade set up adapted to a Quantum Design PPMS.

We have first reproduced data already published for 1D and 2D systems: $(TMTTF)_2PF_6$ [1] $(T_{CO}\approx80K)$ and α -(BEDT-TTF)_2I_3 [2] $(T_{CO}=125K)$, which are archetypal compounds of relaxor and CO driven electronic ferroelectrics.

The same study has been conducted for the 1D family $(o-Me_2TTF)_2X$, X=Cl, Br [3] which presents a non-dimerized structure at high temperature followed by CO and spin-Peierls ground state when cooling down. We have observed a frequency dependent dielectric relaxation below the ordering temperature.

We will present also preliminary results in the monomolecular Mott insulator Au (Et-thiazdt)₂ [4] and in 1D CO 1/4 filled compound (EDT-TTF-CONMe₂)₂AsF₆ [5].



Temperature dependence of the real part of dielectric constant (ɛ') and impedance (1/G) for (o-Me₂TTF)₂Cl

References

- [1] F. Nad et al., Phys. Rev. B 62 (2000) 1753
- [2] T. Ivek *et al.*, *Phys. Rev. Lett.* **104** (2010) 206406; P. Lunkenheimer *et al.*, *Phys. Rev.* B **91** (2015) 245132;
 P. Lunkenheimer and A. Loidl 2015 *J. Phys.: Condens. Matter* **27** 373001
- [3] P. Foury et al., Phys. Rev. B 84 (2011) 195134
- [4] N. Tenn et al., J. Am. Chem. Soc. 131 (2009) 16961
- [5] P. Auban-Senzier et al., Phys. Rev. Lett. 102 (2009) 257001