Charge density glass - facts and fictions

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Abstract. Essential physics of charge density waves (CDW) involves screening tightly bound with the deformation of CDW. Interaction of CDW with impurities or commensurate lattice sets the preferred phase and the residual free carriers screen electrostatically the phase distortion. *Pinning and screening* are responsible for the glassy behavior of CDW, giving them very special position in the field of glasses. The dynamics of the dielectric glass transition strongly resembles the scenario of the freezing in supercooled liquids [1], however relevant degrees of freedom concern the CDW superstructure on characteristic scales of the size of the phase coherence length (l_φ~μm). The glassy phenomenology is completed with low-energy excitations (LEE), a peak in heat capacity (C_p/T^3) [2], long-time energy relaxation and aging found at low-T [3]. It has been shown that LEEs of this new glassy state, soliton-like topological defects, demonstrate very rich and unexpected magnetic properties [4, 5].

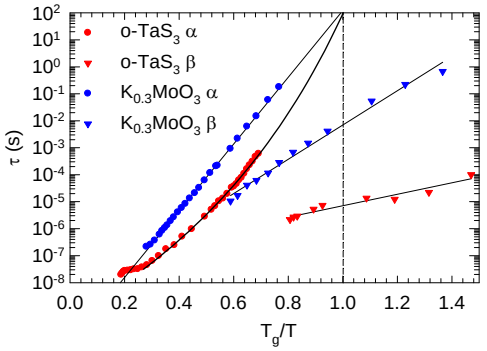

Figure 1. Temperature dependence of the relaxation times of two processes observed in $K_{0.3}MoO_3$ and o-TaS_3. The temperature scale is renormalized to T_g equal 23 K and 50 K respectively.

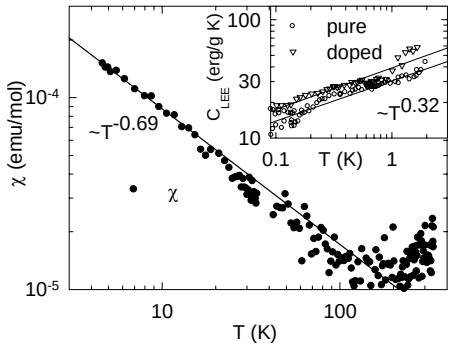

Figure 2. Magnetic susceptibility χ of o-TaS_3. In the inset is the LEEs contribution to c_p.

REFERENCES

1. Starešinić, D. et al. *Phys. Rev. B* ***65,*** 165109 (2002); ibid, *Phys. Rev. B* ***69,*** 113102 (2004)
2. Biljaković, K. , *Phys. Rev. Lett.* ***96***, 039603 (2006).
3. Biljaković, K. et al., *Phys. Rev. Lett.* ***67***, 1902 (1991)
4. Biljaković, K. et al., *Europhys. Lett.* ***62***, 554 (2003)
5. Mélin, K. et al., *Phys. Rev. Lett.* ***97***, 227203 (2006).

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