# FINGERPRINTS OF HOPPING CONDUCTIVITY IN DISORDERED CHARGE DENSITY WAVE SYSTEMS

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Electric conductivity of charge density wave (CDW) systems exhibits rich variety of behavior; thermal activation across the gap at low fields below transition temperature $T_P$, collective contribution (nonlinear conductivity channel) above the threshold field ($E_T$) and variable range hopping (VRH) at low temperatures[1] and in granulated thin films in the whole temperature range[2]. Particularly the origin of the hopping conductivity is still unclear.

We have investigated the influence of disorder on conductivity phenomena in CDW systems $TaS_3$ and blue bronze (BB: $K_{0.3}MoO_3$) in a wide range of temperatures and electric fields using both the DC and pulse measurements at low and high fields respectively. Disorder has been introduced in several ways: (1) synthesis of $TaS_3$ samples doped with Nb, (2) irradiation of nominally pure $TaS_3$ samples and (3) deposition of granular thin BB films by pulsed laser deposition (PLD).

Our results show that the nonlinear conductivity can be described by VRH already below 50 K in contrast to the linear channel, where it appears only below 20 K[1]. Moreover, the point defects in $TaS_3$ introduced by doping and irradiation have no effect on VRH. Together with the dielectric data, it suggests the microscopic picture of soliton hopping in CDW at low temperatures[3,4]. In granular thin BB films, on the other hand, the influence of grain boundaries is overwhelming even above $T_P$, which is in contrast to the previous experiments on thin BB films[5]. The results can be understood by applying recent theoretical results for Beloborodov's Efros-Shlovskii VRH in granular materials[6].

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