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Low frequency noise behavior in mesoscopic charge density wave conductors of o-TaS_3 and $NbSe_3$[1] ZHENZHONG SHI, SUJAY SINGH, Department of Physics, KATIE FARLEY, PETER MARLEY, SARBAJIT BANERJEE, Department of Chemistry, G. SAMBANDAMURTHY, Department of Physics, University at Buffalo - SUNY — In quasi-one dimensional materials, charge density waves (CDW) often form as a result of an instability of the Fermi surface below a critical temperature (T_P). In the presence of disorder, CDW is pinned. As a result, fully gaped materials like o-TaS_3 exhibit an insulator-like behavior below T_P and partially gaped materials like $NbSe_3$ show mixed signatures of both CDW and ungapped quasi-particles. A sufficient dc electric field can depin and slide the CDW. CDW phase fluctuation and phase slippage in the pinned state can be detected as resistance noise in an appropriate frequency window. Herein, results from electrical transport and low frequency noise measurements on single crystalline o-TaS_3 nanoribbons will be presented and compared with results on single-crystalline $NbSe_3$ nanoribbons. Interesting features in the differential conductance measurements across the electric field-driven depinning transitions in the nanoscale samples are observed. The noise magnitude, in the CDW pinned state, shows a non-monotonic dependence on driving electric field in $NbSe_3$ whereas in o-TaS_3 a monotonic dependence is observed. Results will be discussed in light of the differences in these materials and any possible finite size effects.

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