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1/f noise anomalies in nanoribbons of charge density wave materials ZHENZHONG SHI, ADAM STABILE, Department of Physics, PETER M. MARLEY, SARBAJIT BANERJEE, Department of Chemistry, GANAPATHY SAMBANDAMURTHY, Department of Physics, University at Buffalo, Buffalo, NY 14260 — Charge density wave (CDW) as an ordered form of matter has attracted attention for many decades. Below a critical temperature (T_P), CDW materials undergo a Peierls transition and enter the CDW ground state, where the energy is minimized by a collectively pinning mechanism. Under a moderate electric field, CDWs can be depinned and they start sliding. An onset of a large broad band noise (BBN) has been observed in bulk CDW materials as a signature of this depinning process. We report low frequency conductance fluctuation (1/f noise) measurements on single nanoribbon devices of single-crystalline $NbSe_3$, across both Peierls transitions. In the CDW state, a non-monotonic behavior in the noise magnitude was observed when approaching the threshold electric field for depinning: while increasing voltage from the zero-bias limit, the magnitude of BBN first decreases before increasing sharply near the threshold voltage. This unusually large BBN magnitude and the non-monotonic behavior below the depinning threshold suggest some inherent instability that could be suppressed by a small bias field, and is clearly different from results from bulk materials. Transport and noise studies from individual nanoribbons of $NbSe_3$, Ta-doped $NbSe_3$ and o-TaS_3 will be presented.

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