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The impact of crystalline inhomogeneity on electrical transport and $1/f$ noise in MoS_2 field effect transistor[1] SUBHAMOY GHATAK, SUMANTA MUKHERJEE, D.D. SARMA, ARINDAM GHOSH, Indian Institute of Science — We show that both conductivity and low frequency $1/f$ noise are strongly influenced by the presence of localized trap states in ultra-thinMoS_2 field effect transistor. The trap states not only create Coulomb scattering of charge carriers but also slowly exchange carrier with channel. The trap density is quantitatively calculated which turns out two orders of magnitude higher than the typical SiO_2 surface trap density. This suggests a structural origin of the trap states in MoS_2 films. The result was also supported by similar noise measurement on MoS_2 devices on trap free hexagonal boron nitride substrate. The origin of these states is also investigated by spectroscopic studies, which indicate a possible presence of metallic 1T-patches inside the major semiconducting 2H phase.

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