Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Strong Coulomb scattering effects in monolayer WS_2 transistor analyzed by low-frequency noise measurement[1] YOOJOO YUN, MIN-KYU JOO, SEOKJOON YUN, YOUNG HEE LEE, CINAP, IBS, DOES, SKKU, Suwon 16419, Korea, DONGSEOK SUH, DOES, SKKU, Suwon 16419, Korea — A monolayer tungsten disulfide (WS_2) has recently gained great interests as a new semiconducting material for electronic device due to the controllability of bandgap depending on its thickness, high thermal stability and on/off ratio. In real application, however, those intrinsic properties are easily affected by the extrinsic environmental factors such as substrate doping and surface roughness. Especially, the largely distributed interfacial Coulomb impurities give rise to the severe carrier fluctuation, limiting a signal-to-noise ratio. Here, we report the strong Coulomb scattering effect on low-frequency (LF) noise in monolayer WS_2 FETs in respect of temperature [1]. For the better device performance, a nitrogen annealing was carried out. The experimental results are explained well with the carrier number fluctuation and correlated mobility fluctuation model (CNF-CMF), and it is discussed that the electronic transport of WS_2 transistor can be strongly dominated by the enhanced Coulomb scattering source located in WS_2 channel with carrier trapping/de-trapping processes into the oxide traps. [1] Y. Yun, M. Joo, et al., Appl. Phys. Lett. 109, 153102 (2016)

[1]This work was supported by IBS-R011-D1

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Date submitted: 11 Nov 2016 Electronic form version 1.4