Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Large-area tungsten diselenide atomic layers on an insulator substrate grown by vapor phase chemical deposition KWONJAE YOO, National Nanofab Center (NNFC), Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-806, Republic of Korea, IL-SUK KANG, YEHOON PARK, CHI WON AHN, NNFC, KAIST, Daejeon 305-806, Republic of Korea, JONGWOO SHIN, DAE YOOL JUNG, BYUNG JIN CHO, SUNG-YOOL CHOI, Dept. of Electrical Engineering, KAIST, Daejeon 305-701,, HONGKYW CHOI, Dept. of Advanced Device Technology, UST, Daejeon, Korea, 305-333 — Group IV transition metal dichalcogenides such as WS2 and WSe2 are one of attracting material classes which have a physical two dimension of one atomic layer and atomically thin layers like graphene. These materials have interesting features such as an indirect bulk gap makes a transition to a direct band gap in monolayer. Recent research results of FETs showed that a high effective hole mobility of 250 cm^2 /V s with subthreshold swing of 60 mV/dec from an exfoliated monolayer. Indeed it is natural to think that artificial large area synthesis is needed for practical applications. Here we report the large-area tungsten diselenide layers on SiO2 substrate using vapor phase deposition method. Selenium source was evaporated from certain distances to a tungsten thin film on SiO2/Si wafer. Nitrogen gas was flowed during all processes as a carrier gas. Growth was performed at 700 $\sim$ 900 Celsius degree. The size of atomic tungsten diselenide layers simply depends on a wafer and quartz tube size. Good qualities of selected tungsten diselenide layers were investigated by AFM/EFM, SEM/TEM, and Raman spectroscopy. FET and PL data also will be presented.

Kwonjae Yoo
National Nanofab Center (NNFC), Korea Advanced Institute of Science and Technology (KAIST), Daejeon 305-806, Republic of Korea

Date submitted: 21 Nov 2012 Electronic form version 1.4