Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Electronic Transport in Hexagonal Boron Nitride Encapsulated Graphene Nanoribbon WON JONG YOO, DAEYEONG LEE, EUYHEON HWANG, Sungkyunkwan Univ, PHILIP KIM, Harvard Univ — The electronic transport properties of the hexagonal boron nitride (hBN) encapsulated graphene nanoribbon (GNR) are studied. We find that the transport gap of the hBN encapsulated GNR is almost identical to that of the same size GNR on the silicon dioxide (SiO_2) substrate in spite of their quantitatively different physical parameters, indicating that the transport gap of the hBN encapsulated GNR is affected mainly by edge disorders rather than surface disorders. The relatively lower density of Coulomb diamonds (20/Vμm), larger charge island diameter (80 nm), longer hopping length (200 nm), and other results obtained from electrical and temperature dependent measurements show that the hBN encapsulated GNR has the less degree of disorder because of the less surface disorder. The insulating behavior within the transport gap can be understood through the one-dimensional variable range hopping (VRH) and it is maintained up to $\sim$50 K which is higher than that of the GNR on SiO_2. However, with increasing temperature the VRH transport behavior crosses over to the thermally activated insulating behavior. Moreover, the transport gap of the hBN encapsulated GNR shows clearer band edges and fewer impurity states within the band gap as compared with that of the GNR on SiO_2.

Won Jong Yoo
Sungkyunkwan Univ

Date submitted: 15 Nov 2014 Electronic form version 1.4