Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Coupling of $MoS_2$ thin films with different substrates probed by temperature dependent Raman Spectroscopy** LIQIN SU, YONG ZHANG, Electrical and Computer Engineering Department, University of North Carolina at Charlotte, Charlotte NC 28223, YIFEI YU, LINYOU CAO, Department of Materials Science and Engineering, North Carolina State University, Raleigh NC 27695 — Few-layer $MoS_2$ is emerging as a new 2-D material beyond graphene, showing a number of interesting properties that could lead to applications in optoelectronics. In most if not all real applications, the $MoS_2$ films are expected to be supported by substrates, thus the film-substrate coupling is inevitable. In this work, we study the temperature-dependent Raman shifts of both in-plane ($E^1_{2g}$) and out-of-plane ($A_{1g}$) phonon modes for single-layer and bi-layer $MoS_2$ films on different substrates in a temperature range of 25 – 500 °C. By investigating the temperature dependence of Raman scattering, we show that, with increasing temperature, the chemical bonding between film and substrate introduces a damping to $E^1_{2g}$ Raman temperature shift for the $MoS_2$ thin-film grown on sapphire by CVD, while the changes in the film morphology leads to significant nonlinear effects for the $A_{1g}$ mode, such as nonlinear sometimes even non-monotonic temperature shift of Raman frequency and temperature dependence of Raman linewidth, for the transferred $MoS_2$ thin-film on $SiO_2$/Si substrate.

Liqin Su
Electrical and Computer Engineering Department,
University of North Carolina at Charlotte, Charlotte NC 28223

Date submitted: 13 Nov 2013 Electronic form version 1.4