Abstract Submitted
for the SES14 Meeting of
The American Physical Society

Understanding ultrafast relaxation dynamics of hot carriers and phonons at the graphene-diamond interface ZEYNAB JARRAHI, JIMMY L. DAVIDSON, NORMAN TOLK, Vanderbilt University — In the past few years, there has been increasing interest in single and poly crystalline diamond as the substrate of choice for graphene FET and interconnects. Yu et al have observed a substantial increase in the current carrying capacity of graphene-diamond FETs compared to conventional SiO2-Si [1]. The performance of such devices is ultimately dependent on the relaxation dynamics of hot carriers and phonons at the Gr /diamond interface which is the motivation behind this research. Using ultrafast degenerate pump probe spectroscopy, our main goal is to understand the vastly diverse hot carrier induced dynamics of CVD single layer graphene on different substrates. The transient differential reflection and transmission spectra reveal the time scales associated with the cooling cascade of non equilibrium photo generated species and the band filling dynamics. Understanding how the relaxation dynamics of graphene is altered by coupling to different substrates such as diamond and deciphering the effects of electron and optical and acoustic phonons scattering mechanisms involved, will pave the way towards realization of higher performance carbon sp2/sp3 technology.

[1] Yu et al. Nano Letters 2012 12 (3), 1603-1608

Zeynab Jarrahi
Vanderbilt Univ

Date submitted: 09 Oct 2014 Electronic form version 1.4