Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Mechanism for resonant energy transfer in plasmonic light-harvesting materials[1] SCOTT CUSHING, JIANGTIAN LI, NIANQIANG WU, ALAN BRISTOW, West Virginia University — Localized surface plasmon resonance (LSPR) is a promising route to extending the light-harvesting of semiconductors into the visible and near infrared. Core-shell nanostructures are studied using transient absorption spectroscopy to explore the carrier dynamics and energy harvesting mechanism [1]. The metal core@Cu_2O shell nanoparticles have a broad plasmon resonance centered at 650 nm. The amplitude of the spectral dependence of the transient absorption can be fit using three contributions: the semiconductor density of states, the LSPR, or the overlap integral between the two. The fitting procedure reveals the energy transfer mechanism in Au@Cu_2O is dominated by a plasmon induced resonant energy transfer, while the energy transfer in Ag@Cu_2O is a combination of resonant energy transfer and hot electron injection from the metal to semiconductor. The effects of core composition and shell thickness are studied with the aim of finding the best combination for a viable full solar spectrum, plasmon-enhanced photocatalyst. [1] S. K. Cushing, J. T. Li, F. K. Meng, T. R. Senty, S. Suri, M. J. Zhu, M. Li, A. D. Bristow, N. Q. Wu, J. Am. Chem. Soc. 134, 15033 (2012).

[1]Department of Mechanical and Aerospace Engineering, Department of Physics, West Virginia University, Morgantown WV 26505

Scott Cushing
West Virginia University

Date submitted: 08 Nov 2012 Electronic form version 1.4