Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Integration of 2-Dimensional Materials for Thermoelectric Power Generation FADHEL ALSAFFAR, ABDULRAHMAN AL HUSSAIN, MOH. R. AMER, None, CENTER OF EXCLENCE FOR GREEN NANOTECHNOLOGIES COLLABORATION, DEPARTMENT OF ELECTRICAL ENGINEERING (UCLA) COLLABORATION — Recent developments in nanomaterial research have significantly progressed the performance of thermoelectric devices. Theoretical investigations of the thermoelectic properties of 2-Dimentional monolayers demonstrate a high figure of merit (ZT) .[1, 2]. Here, we investigate the integration of these 2-Dimensional materials for power generation applications using solar heat. We show that using black phosphorus monolayer (phosphorene) as the p-type material, and Molybdenum disulfide (MoS_2) monolayers as the n-type material, we get an effective figure of merit (ZT) at least (1.5) with a conversion efficiency of 13% at 280^{o}C. Our results suggest that the integration of various 2-Dimensional materials is a promising approach for commercial thermoelectric power generation applications. **References:** .[1] W. Huang, X. Luo, C. K. Gan, S. Y. Quek, and G. Liang, "Theoretical study of thermoelectric properties of few-layer MoS 2 and WSe 2," *Physical Chemistry Chemical Physics,* vol. 16, pp. 10866-10874, 2014. [2] R. Fei, A. Faghaninia, R. Soklaski, J.-A. Yan, C. Lo, and L. Yang, "Enhanced thermoelectric efficiency via orthogonal electrical and thermal conductances in phosphorene," *Nano Letters,* vol. 14, pp. 6393-6399, 2014.

Fadhel Alsaffar
None

Date submitted: 05 Nov 2015 Electronic form version 1.4