Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Highly-Oriented Molecular Assembly on Monolayer Graphene for Boosting Photon Harvesting in Bilayer Organic Solar Cells KILWON CHO, Department of Chemical Engineering, Pohang University of Science and Technology — A novel approach to dramatically enhance the photon harvesting in organic solar cells was demonstrated by utilizing a graphene-organic heterointerface. A large area, residue-free monolayer graphene was inserted at anodic interface to serve as an atomically thin, transparent and highly conductive epitaxial template for organic crystal growth with specific orientation. The anisotropic nature of optoelectronic properties of organic semiconductor molecules provided a significant enhancement in exciton diffusion length, optical absorption, charge carrier lifetime as well as the energy level alignment at metal-organic and organic-organic interfaces. Especially, the exciton diffusion length increases up to nearly 100 nm, which allows the device thickness to be doubled to yield 5 times higher power conversion efficiency in comparison to conventional planar heterojunction organic photovoltaic cells. Theoretical simulations as well as systematic studies on the film structure and optoelectrical properties were performed to corroborate our new findings.

Kilwon Cho
Department of Chemical Engineering,
Pohang University of Science and Technology

Date submitted: 14 Nov 2014 Electronic form version 1.4