Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Roles of SiN_x layers in light trapping and carrier collection of nanostructured crystalline Si solar cells YUNAE CHO, EUNAH KIM, MINJI GWON, DONG-WOOK KIM, Ewha Womans University, HYEONG-HO PARK, Korea Advanced Nanofab Center, JOONDONG KIM, Incheon National University — We investigated optical properties and photovoltaic (PV) performance of nanostructured Si solar cells with and without SiN_x dielectric layers. The SiN_x layer contributed to the enhancement of internal quantum efficiency of the nanostructured cells at both short and long wavelengths. In contrast, the surface passivation of SiNx layers on flat cells helped the carrier collection mainly at short wavelength. The surface nanopatterned array enhanced the optical absorption and also concentrated incoming light near the surface in broad wavelength range, revealed by experimental data and optical simulation results. As a result, the nanostructured cells had high density of photo-generated carriers near the surface. This could lead to significant recombination loss of the cells without SiN_x layers. Our work suggested that the SiNx layer played a crucial role in the improved carrier collection of the nanostructured Si PV devices.

Yunae Cho
Ewha Womans University

Date submitted: 05 Nov 2015 Electronic form version 1.4