Electronic Supplementary Information

## Performance improvement of $Sb_2S_3$ -sensitized solar cell by introducing hole buffer layer in cobalt complex electrolyte

Sang Hyuk Im, Hi-jung Kim, Jae Hui Rhee, Choong-Sun Lim, and Sang Il Seok





Fig. S1. (a) TEM image of  $Sb_2S_3$  deposited on mp-TiO<sub>2</sub>, (b) EDX spectrum, and (c) XRD pattern of produced  $Sb_2S_3$ .



**Fig. S2**. (a) Incident photon-to-current conversion efficiency (IPCE) of  $Sb_2S_3$  sensitized solar cells with and without scattering layer, (b) their diffused reflectance spectra, (c) TEM image of nm-TiO<sub>2</sub>, and (d) SEM image of TiO<sub>2</sub> for scattering layer.



**Fig. S3.** (a) J-V curves of mp-TiO<sub>2</sub>/P3HT (P3HT sensitized solar cell) device and (b) its corresponding EQE spectrum.



Fig. S4. J-V curves of Sb<sub>2</sub>S<sub>3</sub>/N3 dye sensitized solar cell.