Supporting Information

Improved Light Harvesting Efficiency of Semitransparent Organic Solar Cells Enabled by Broadband/Omnidirectional Subwavelength Antireflective Architectures

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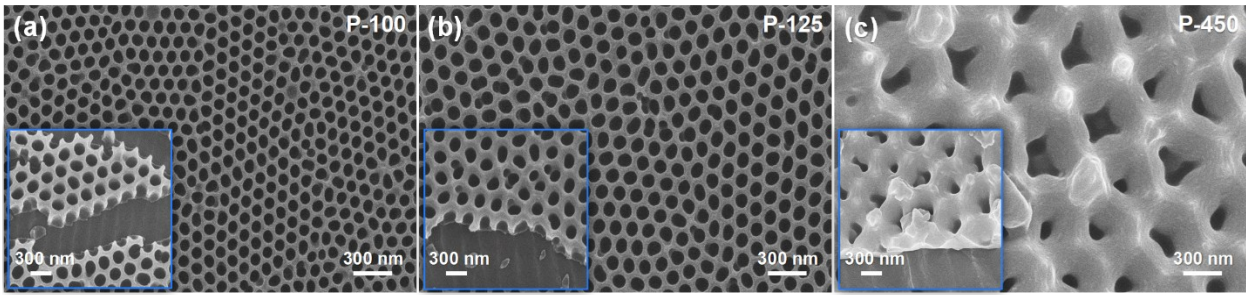

Figure S1. Top-view and cross-sectional SEM images of the AAO molds with various periods of (a) 100 nm, (b) 125 nm and (c) 450 nm. The diameter/height of all these molds was noted in the range of 80-120 nm/ 150-200 nm.

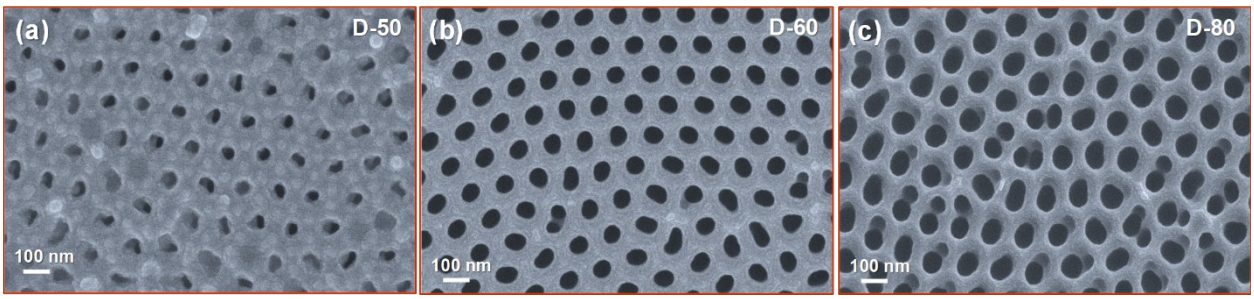

Figure S2. SEM images of the AAO molds with the fixed period of 125 nm and different diameters of (a) 50 nm, (b) 60 nm, and (c) 80 nm.

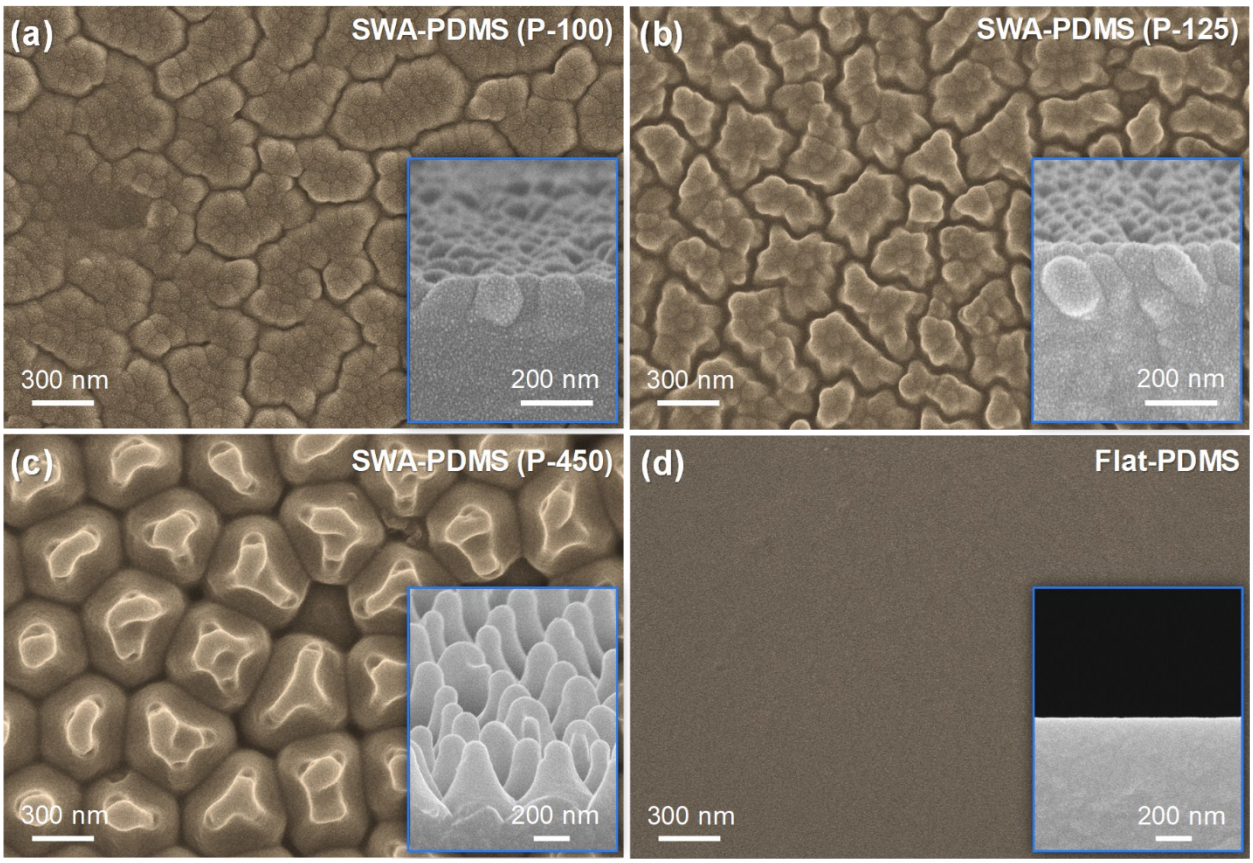

Figure S3. Top-view and cross-sectional SEM images of the SWA-PDMS with different periods of (a) 100 nm, (b) 125 nm, and (c) 450 nm, respectively. For comparison, the SEM Image of the flat-PDMS without any SWAs is also shown in (d).

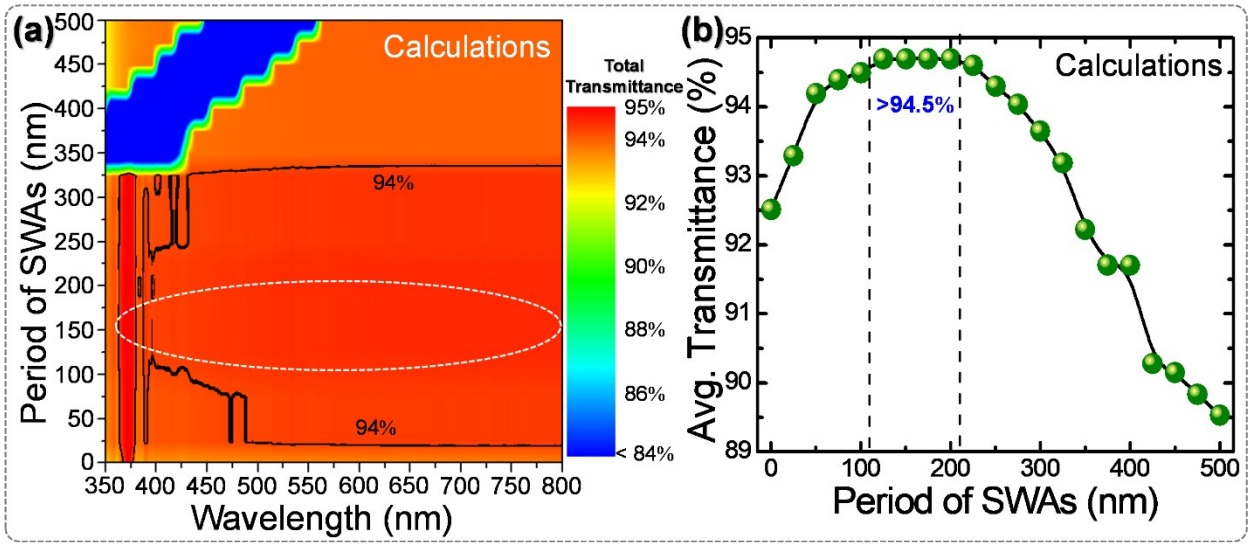

Figure S4. (a) Contour plot of the variation of the calculated transmittance spectra of the SWA-PDMS/glass as a function of wavelength and period of SWAs. (b) Calculated T_{avg} value of SWA-PDMS/glass over the wavelength range of 350-800 nm, as a function of period of SWAs.

Effect of SWAs period on total transmittance of SWA-PDMS/glass:

We systematically investigated the effect of SWAs period on the total transmittance of SWA-PDMS, using RCWA theoretical simulation studies. So, the period of SWAs was varied from 0 to 500 nm with an interval of 25 nm and examined the influence of total transmittance of SWA-PDMS over the wavelength range of 350-800 nm. Figure S4a shows the contour plot of the variation of the calculated total transmittance spectra of the SWA-PDMS/glass as a function of the wavelength and period of SWAs. Figure S4b also depicts the calculated T_{avg} in the wavelength range of 350-800 nm for the SWA-PDMS/glass at various periods of SWAs. These simulation results clearly suggest that the total transmittance or T_{avg} values of SWA-PDMS is enhanced by increasing the period of SWAs from 0 to 100 nm. Further, it reaches a maximum of >94.5% and almost identical, while the period of SWAs is in the range of >100 to 225 nm. By further increasing the period from 250 to 500nm, the total transmittance or T_{avg} value of SWA-PDMS is gradually decreased from >94.5% to 89.5%, respectively.

Therefore the simulation results are clearly concluding that the highest total transmittance of SWA-PDMS/glass can be achieved only when the period of SWAs are in the range of >100 to 225 nm. However, we experimentally used SWA-PDMS layers with only the three periods of 100, 125, and 450 nm. Therefore, by considering the above theoretical simulation and experimental results, we can conclude that the SWA-PDMS with the period of 125 nm is more efficient to enhance the total transmittance of glass over the wavelength range of 350-800 nm.

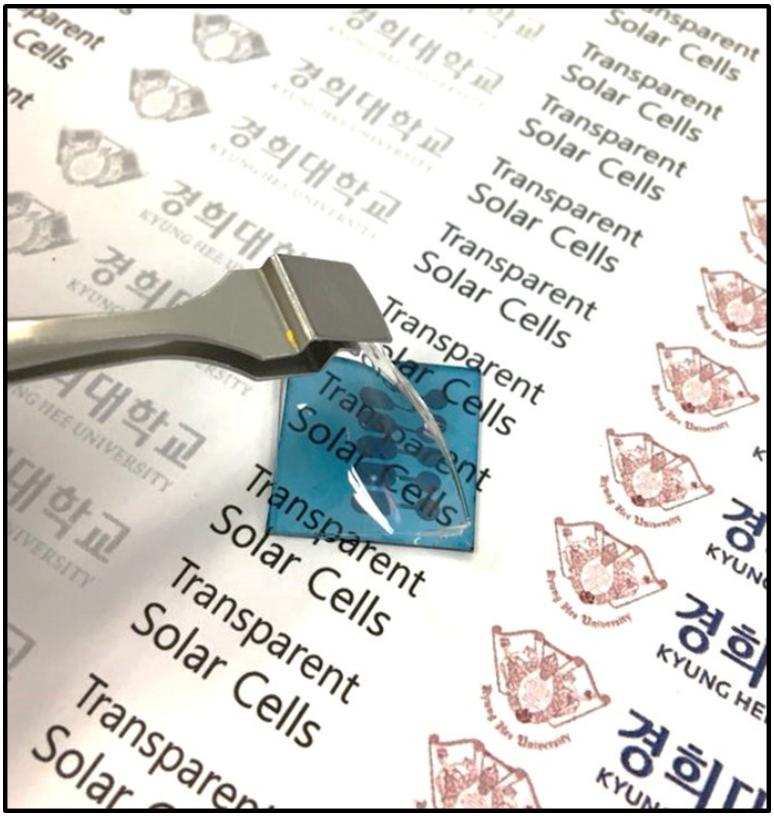

Figure S5. Photographic image of the SWA-PDMS (P-125) with ease of lamination on OSCs.

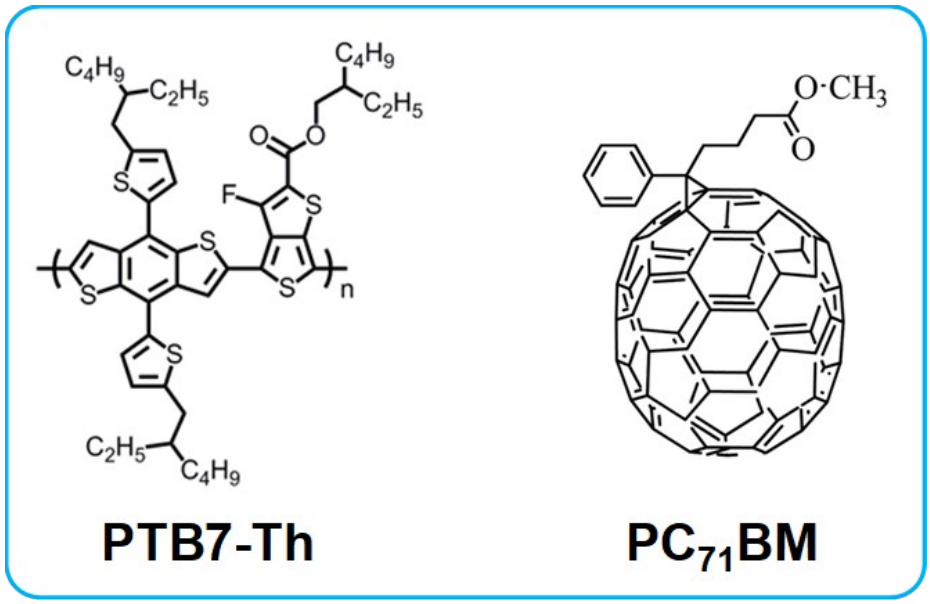

Figure S6. Chemical structure of the photoactive materials used in this work.

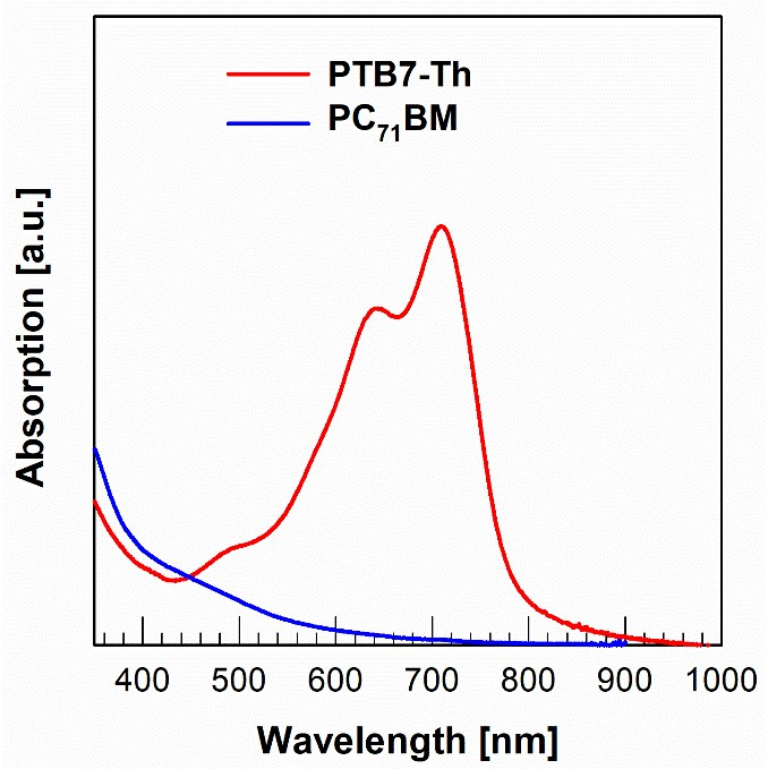

Figure S7. UV-Vis absorption spectra of photoactive materials used in this work.