Supplementary Material

Volumetric plasmonic resonator architecture for thin-film solar cells

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We compute the increase in absorption performance under AM1.5G (air mass 1.5 global) solar radiation via using (1).

$$\frac{\int_0^{\infty}\left(\frac{A_{TM}(\lambda)+A_{TE}(\lambda)}{2}\right)\times AM1.5G(\lambda)d\lambda-\int_0^{\infty}A_{bare}(\lambda)\times AM1.5G(\lambda)d\lambda}{\int_0^{\infty}A_{bare}(\lambda)\times AM1.5G(\lambda)d\lambda}\times 100 \qquad (1)$$

We studied the effect of silver grating periodicity on the overall absorptivity for the top resonator and volumetric resonator architectures (Fig. S1). The results confirm that it is possible to obtain a larger enhancement in the absorptivity using the volumetric architecture. We observe the maximum absorptivity in the case of 80 nm ≤ P ≤ 120 nm. This is because of the increased surface plasmon modes created between the vertically coupled plasmonic resonators. The maximum level of absorption under AM 1.5G is achieved with 200 nm periodicity.

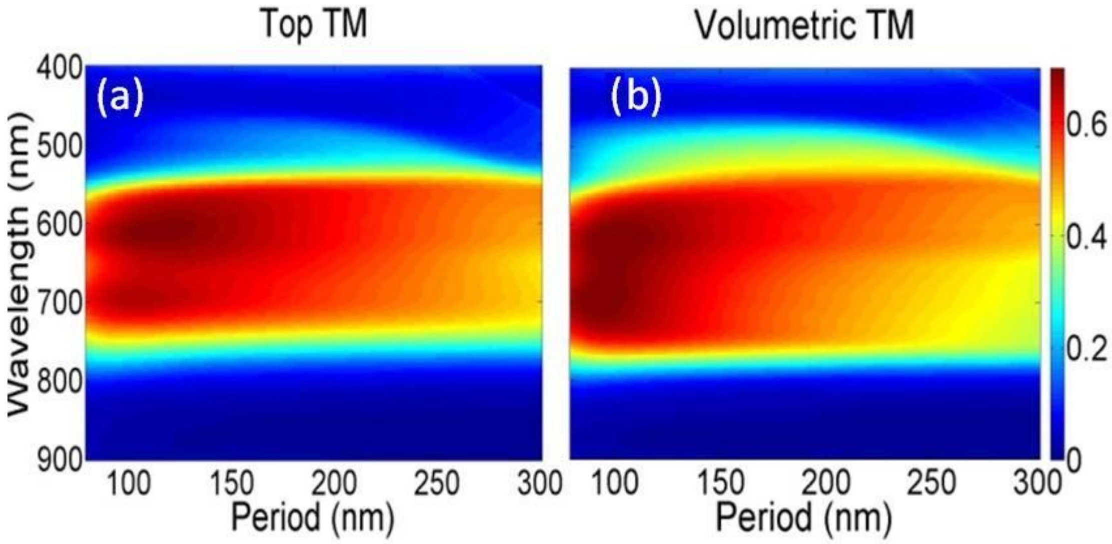

Fig. S1. Normalized absorptivity of the active layers as a function of periodicity (P) of the silver grating under TM-polarized light. The absorption spectra are computed for varying P while keeping the same device parameters for w1=50 nm, w2=30 nm, LT1=100 nm, LT2=20 nm, LT3=11 nm, LT4=4 nm and LT5=12 nm.