Electronic Supplementary Material (ESI) for RSC Advances

Electronic Supplementary Information

Influence of Au thickness on the performance of plasmonic enhanced hematite photoanodes

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Front- versus back-side illumination- TE case

Fig. S1 shows the absorptance in Au stripes and in hematite together with reflectance in both front-side and back-side illumination in TE case. In this case the absorption in Ag is significantly larger in front-side illumination relative to back-side illumination whereas the trend for the desirable absorptance in hematite is the reverse. The reflectance in the 400 to 550 nm range, where TE absorptance is large, is significantly larger for front-side illumination.

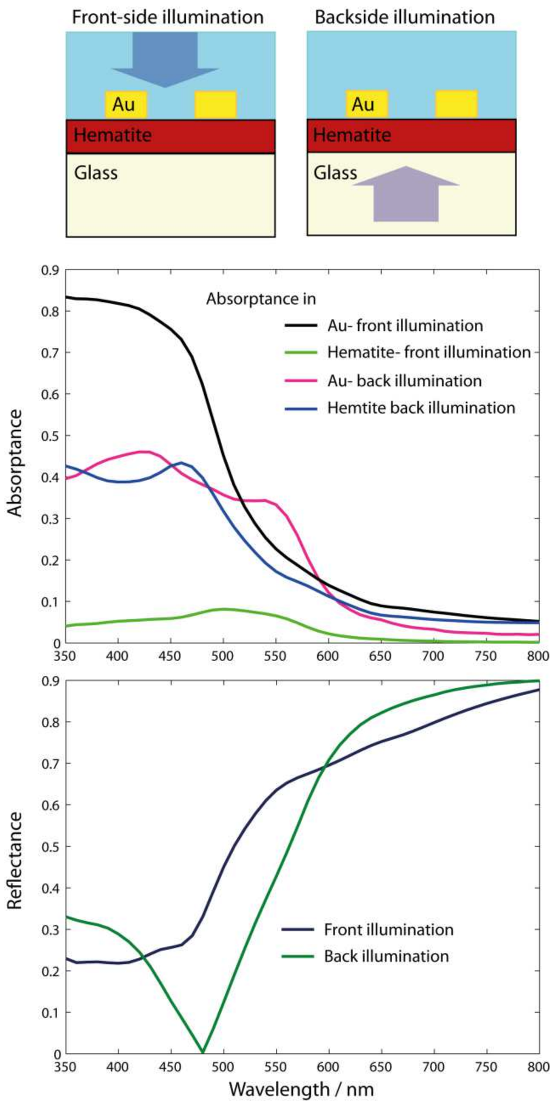

Fig S1. Schematic of front- and back-side illumination, the absorptance and reflectance values under TE wave incidence.

Front- versus back-side illumination- TM case

Fig. S2 shows the absorptance in Au stripes and in hematite together with reflectance in both front-side and back-side illumination in TM case. In this case the absorption in Ag is significantly larger in front-side illumination relative to back-side illumination whereas the trend for the desirable absorptance in hematite is the reverse. The reflectance in the 430 to 720 nm range is significantly larger for front-side illumination.

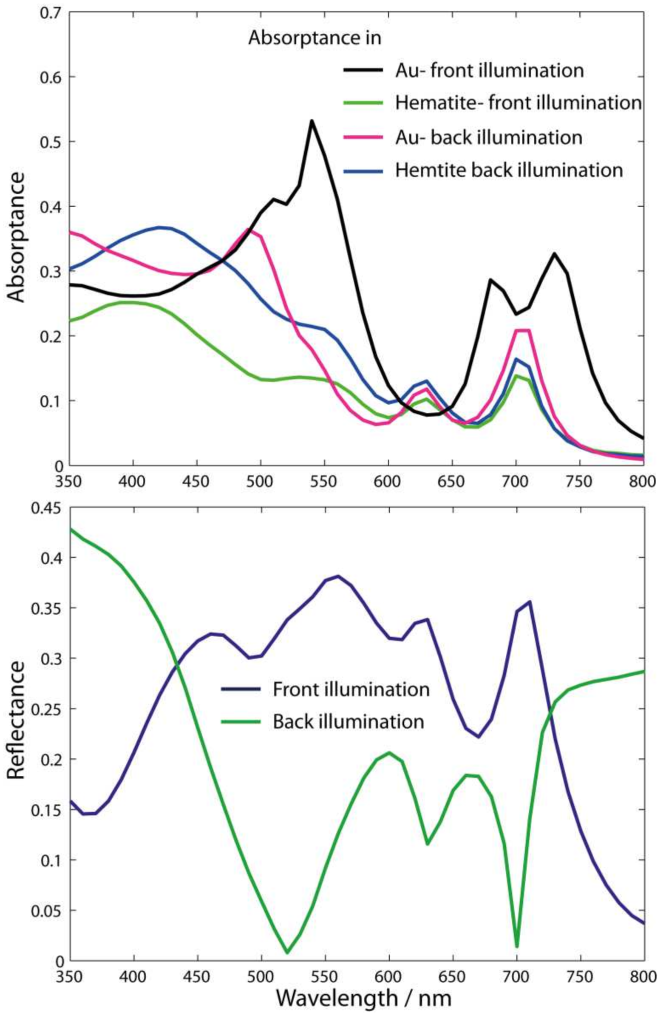

Fig S2. The absorptance and reflectance values under TM wave incidence.

Effect of edge bluntness

The upper edge of the Au rectangles is rounded to simulate the actual structures that are produced in standard nanofabrication processes. In the optimal structure, the radii of the curvatures of the edges are varied from 0 nm (for sharp edges) to 10 nm when the upper part of the rectangle becomes completely round. The absorbed current densities (J_a) are calculated and reported in Table I. They reveal that the influence of edge bluntness on the performance of the optimal structure is negligible.

Table I. The calculated absorbed current densities (J_a) in $mA.cm^{-2}$ for the optimal (w, T, h) = (20, 100, 140) nm Au features on 10 nm hematite layer.

	R=0 nm	R=2 nm	R=4 nm	R=6 nm	R=8 nm	R=10 nm
TE	5.08006	5.080093	5.08031	5.080608	5.080875	5.081209
TM	4.358941	4.36581	4.363866	4.358131	4.368813	4.367841