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Supporting Information

Hybrid Plasmonic Gold-Nanorod-Platinum Short-Wave Infrared Photodetectors with Fast Response

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I. Evolution of the photoresponse characteristics of the Au-NRs/Pt device as a function of the Pt microwire length and width.

We fabricated and characterized various Pt microwires with different widths and lengths and we studied the impact of them on the time-dependent photoresponse characteristics of Au-NRs/Pt devices. Indeed, the size of the microwire is supposed to strongly influence the heat dissipation in similar structures.[1] We first fabricated a series of microwires with a fixed length (1500 µm) but a variable width (from 200 µm to 2 µm) (Figure S2a). After that, we fabricated and characterized much shorter devices (width = 2 µm) where we varied the length from 150 µm to 10 µm (Figure S2b). The response time of such Au-NRs/Pt devices upon the laser illumination is summarized in Table S1.

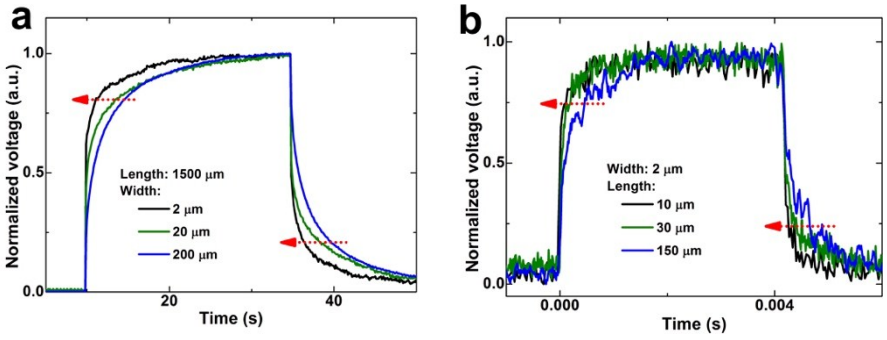

Figure S1. Summary of the response time of a series of Au-NRs/Pt devices with different lengths and widths.

Au-NRs/Pt device (large size) Length = 1500 μm, different widths			Au-NRs/Pt device (small size) Width = 2 μm, different lengths		
Width [μm]	Rise time [s]	Decay time [s]	Length [μm]	Rise time [μs]	Decay time [μs]
2	0.65	0.95	10	97	131
10	1.12	1.96	30	172	226
20	2.28	3.23	50	282	358
200	3.63	4.54	150	470	632

Table S1. Summary of the response time from a series of Au–NRs/Pt devices.

II. Photoresponsivity in terms of R/P (Ω/W) and the corresponding (ΔI)/P (mA/W) under a DC bias of 1V (P = laser power)

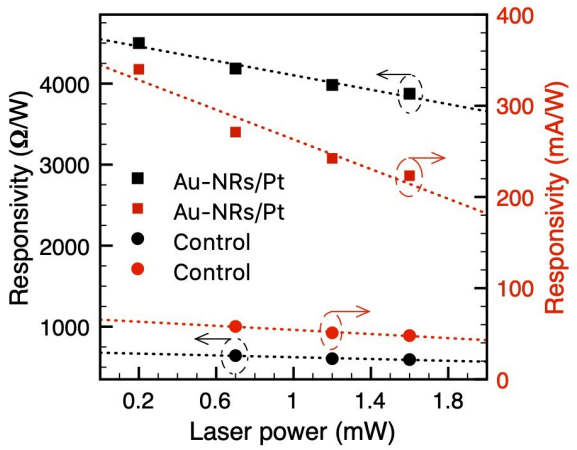

Figure S2. The photoresponsivity (in terms of R/P (Ω/W), P = laser power) and the corresponding (ΔI)/P (mA/W) under a DC bias of 1V (P = laser power) of the Au-NRs/Pt device and the control device at different laser powers. The dash lines represent the linear fit of the data.

III. The wavelength dependence of the change of resistance (ΔR) of an Au-NRs/Pt device

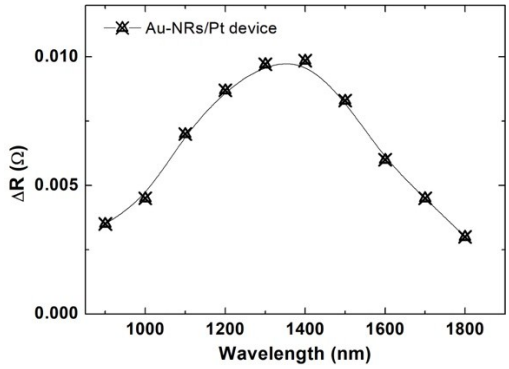

Figure S3. The wavelength dependence of the change of resistance (ΔR) of an Au-NRs/Pt device (width = 2 μm, length = 1500 μm). Experiment was performed under a monochromatic illumination with an intensity ranging from 0.026 μW/μm^2 at 900 nm to 0.008 μW/μm^2 at 1800 nm.

IV. Photoresponse as a function of frequency from 200 Hz to 150 kHz for 20-μm and 30-μm devices.

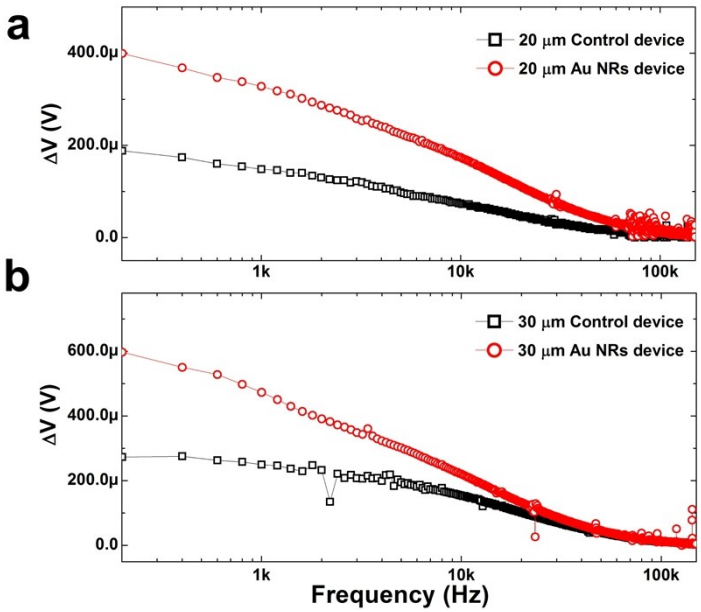

Figure S4. Evolution of the photoresponse as a function of laser modulation frequency from 200 Hz to 150 kHz for (a) the 20-um control and 20-um Au-NRs/Pt device and (b) the 30-um control and 30-um Au-NRs/Pt device.

V. Normalized voltage drop for different frequencies

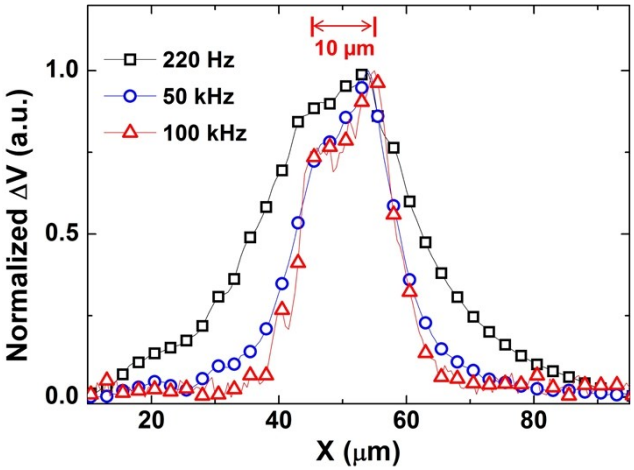

Figure S5. The normalized voltage drop for different frequencies measured on the Au-NRs/Pt device shown in Figure 4 of the main text allowing the comparison on its spatial distribution.

Reference:

1 K. J. Kim, J. C. Lee, S. B. Choe and K. H. Shin, *Appl. Phys. Lett.*, 2008, **92**, 192509.