Supporting Information

Optical Field Coupling in ZnO Nanorods Decorated with Silver Plasmonic Nanoparticles

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Keywords: Plasmonic nanoparticles, Zinc Oxide Nanorods, transient pump-probe spectroscopy, radiative and non-radiative plasmonic decoupling.

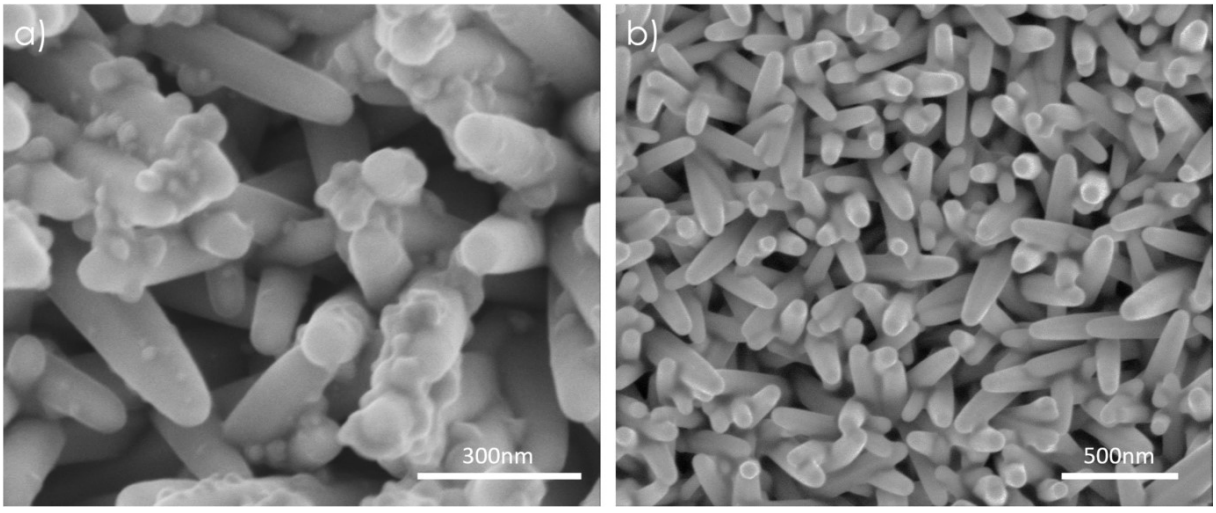

Figure S 1: (a) SEM image of the ZnO NRs/Al_2O_3/Ag NPs sample. Slight aggregation of the Ag NPs is observable. (b) ZnO NRs after deposition of 4 nm Al_2O_3. The original architecture of the NRs was preserved after Al_2O_3 deposition.

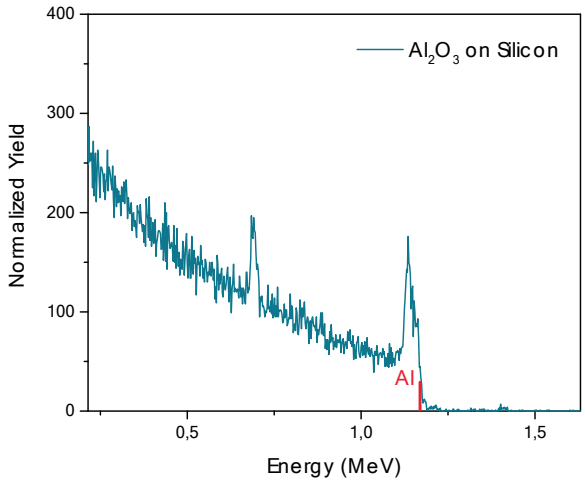

Figure S 2: Rutherford Backscattering spectra of the Al_2O_3 film deposited on silicon substrate.

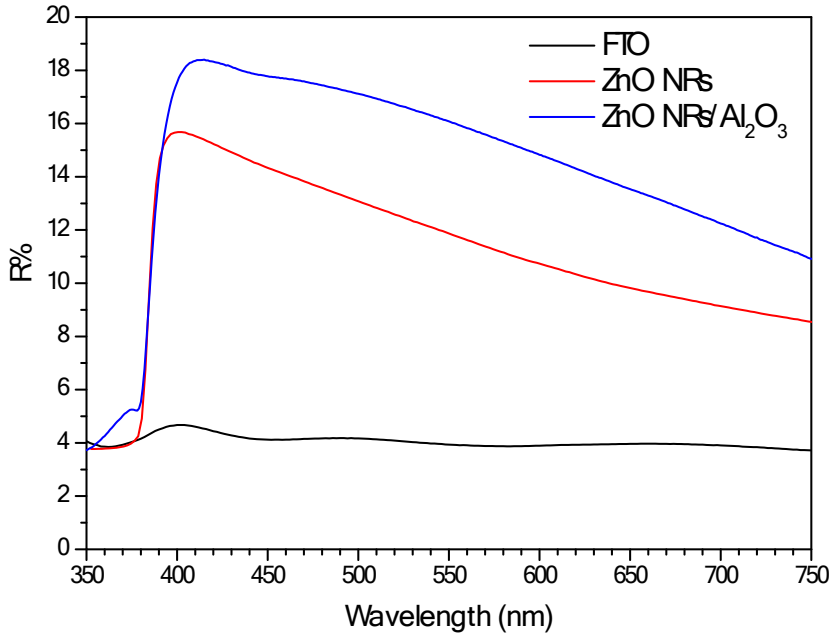

Figure S 3: Diffused reflectance spectroscopy of the ZnO NRs after Al_2O_3 deposition did not show any changes in the absorption edge of ZnO NRs.

Table S 1: Photoluminescence quantum yield (PL QY) of ZnO NRs samples before and after decorating with Ag NPs. The samples were excited with 325 nm UV light from Xe lamp. QY(tot) refers to the ratio of total sample emission vs. absorption. QY(DLE) presents the ratio of DLE emission (between 450 and 750 nm) vs. absorption. In order to avoid discrepancy and to actuate a

detailed comparison, the presented QY data in each column were conducted on the same ZnO NRs substrate before and after deposition of corresponding Ag NPs and/or Al_2O_3 layer.

Bare Sample	ZnO	ZnO	ZnO
QY(tot) %	1.2	0.7	0.9
QY(DLE) %	1.1	0.6	0.8
After deposition	ZnO/Al_2O_3	ZnO/Ag NPs	ZnO/Al_2O_3/Ag NPs
QY(tot) %	0.7	0.5	0.6
QY (DLE)%	0.6	0.4	0.6
QY(tot) %	1.2	0.7	0.9

The PL QY is calculated according to following equation: $\eta = \frac{E_s}{S_E - S_s}$

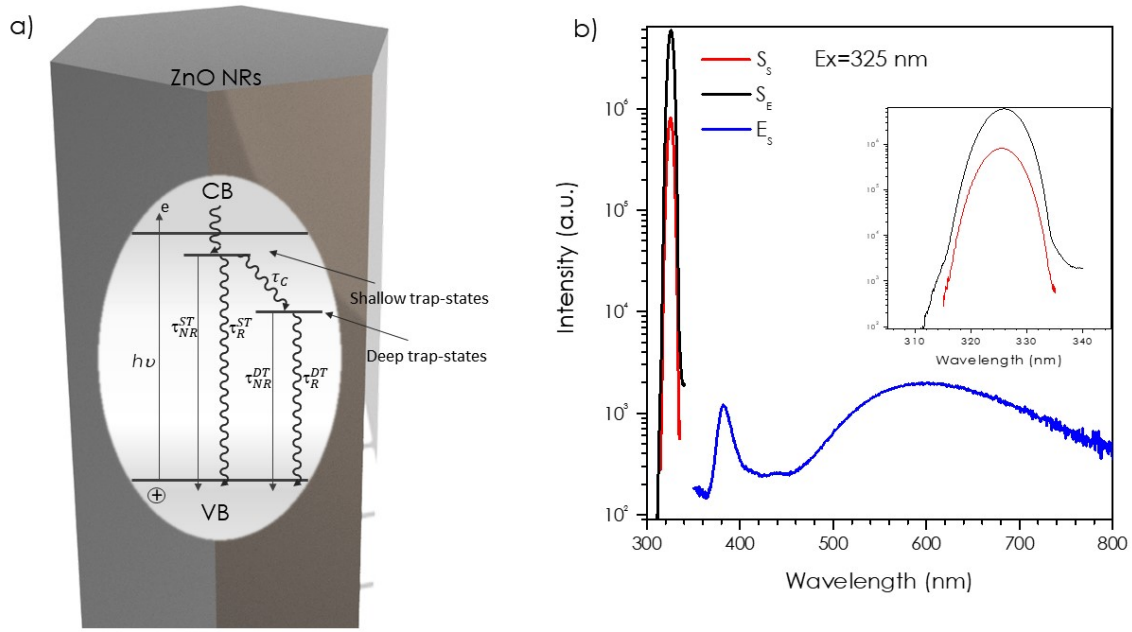

Figure S 4: (a) Two-state trapping model consisting of shallow trap-states and deep trap-states of ZnO NRs. The terms τ_R and τ_{NR} corresponds to the radiative and non-radiative PL decay time-constants of the ZnO NRs. (b) A typical set of spectra for PL QY calculation. The spectra were recorded using FLS980 Edinburgh photometer equipped with integrating sphere. S_E, S_S and E_S

refer to the scattering of excitation light, scattering of sample and the emission from sample, respectively.

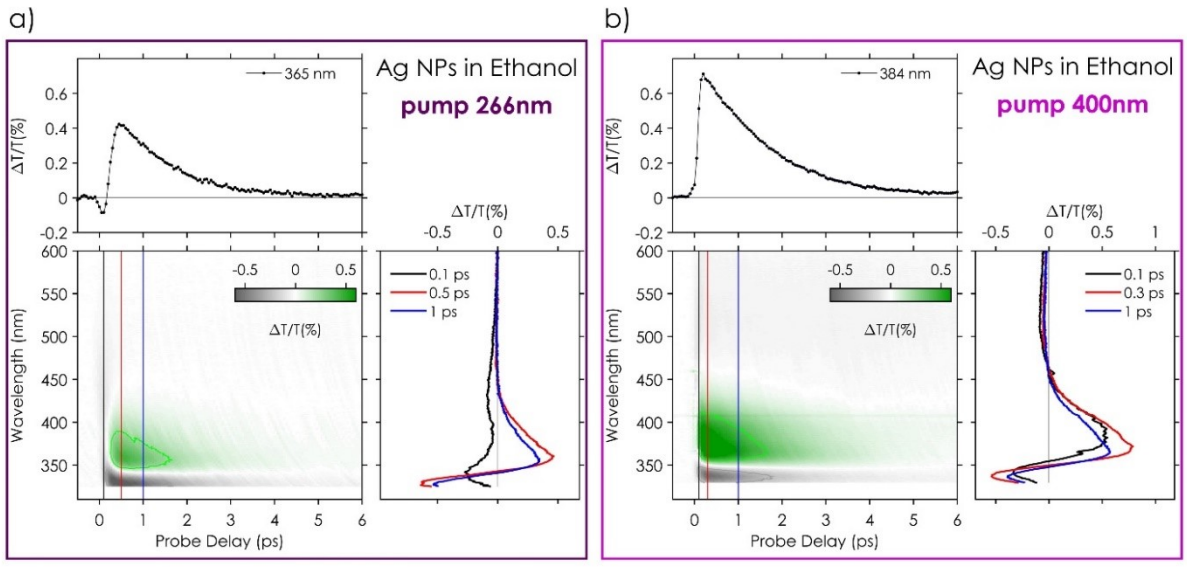

Figure S 5: Differential transmission $\Delta T/T$ datasets of Ag NPs dissolved in ethanol obtained by pumping with (a) pump pulses centered at 266 nm close to Ag interband transition and (b) pump pulses centered at 400 nm close to Ag NPs *LSPR*. Positive $\Delta T/T$ peak associated with Ag NPs LSPR transient response is reached within 500 fs for both pumping conditions (cf. $\Delta T/T$ dynamic and red $\Delta T/T$ spectra in top and right panels of (a) and (b)).

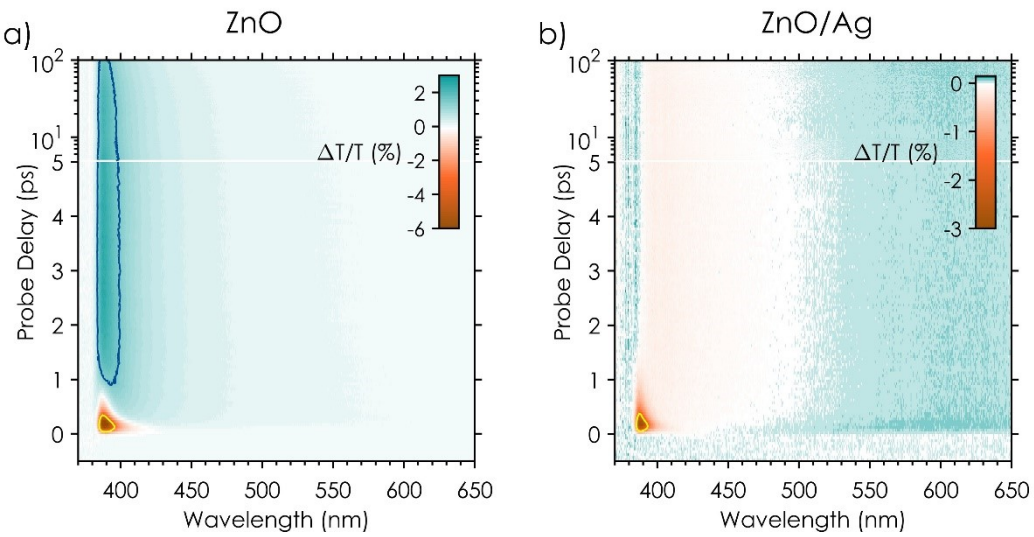

Figure S 6: Differential transmission $\Delta T/T$ maps of (a) bare ZnO NRs and (b) ZnO/Ag. Yellow and blue contour lines correspond to surface levels at half value of the negative and positive peak values of the differential transmission datasets. Colorbar limits are adjusted to cover the full dynamic range of the $\Delta T/T$ signals. Pump wavelength is 266 nm (i.e. 4.7 eV) and incident pump fluence is ~ 95 μJ cm^{-2}.

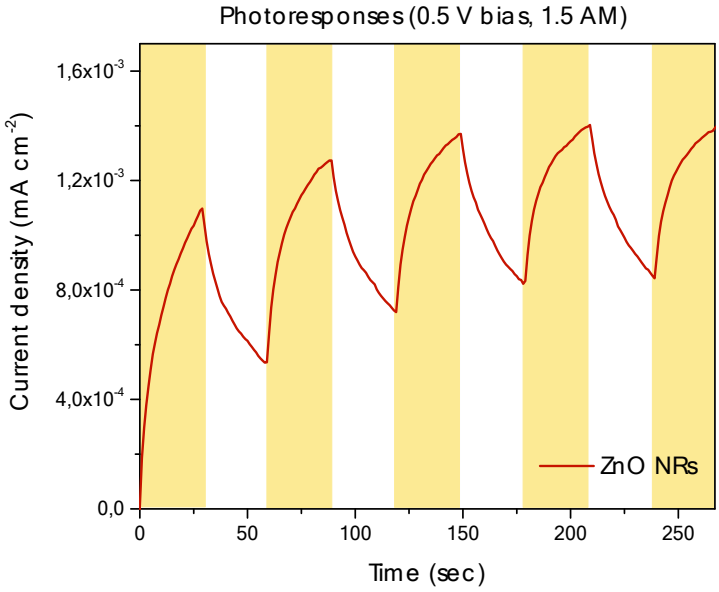

Figure S 7: Photoresponse of ZnO NRs to pulsed solar light (1.5 AM from solar simulator) illumination under 0.5 V forwarded potential.