

Electronic Supplementary Information

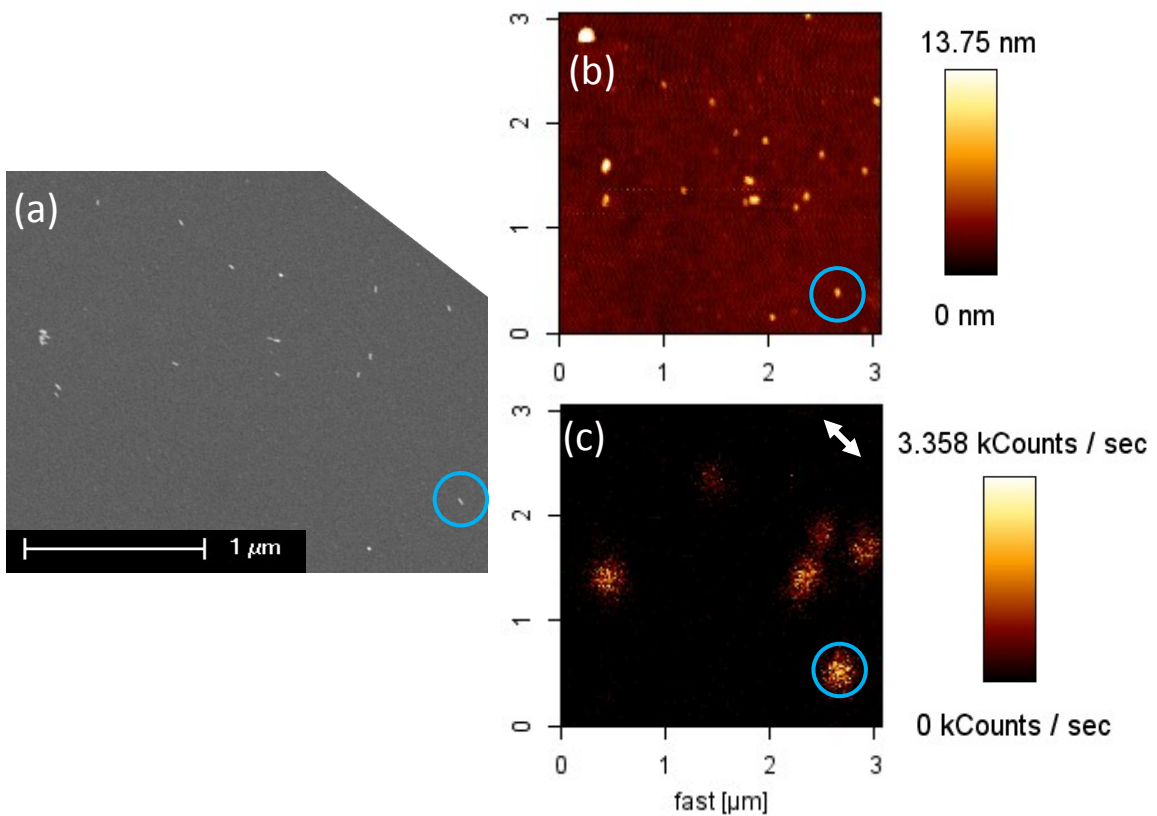
**From plasmon-induced luminescence enhancement in gold nanorods to plasmon-induced luminescence turn-off: a way to control reshaping**

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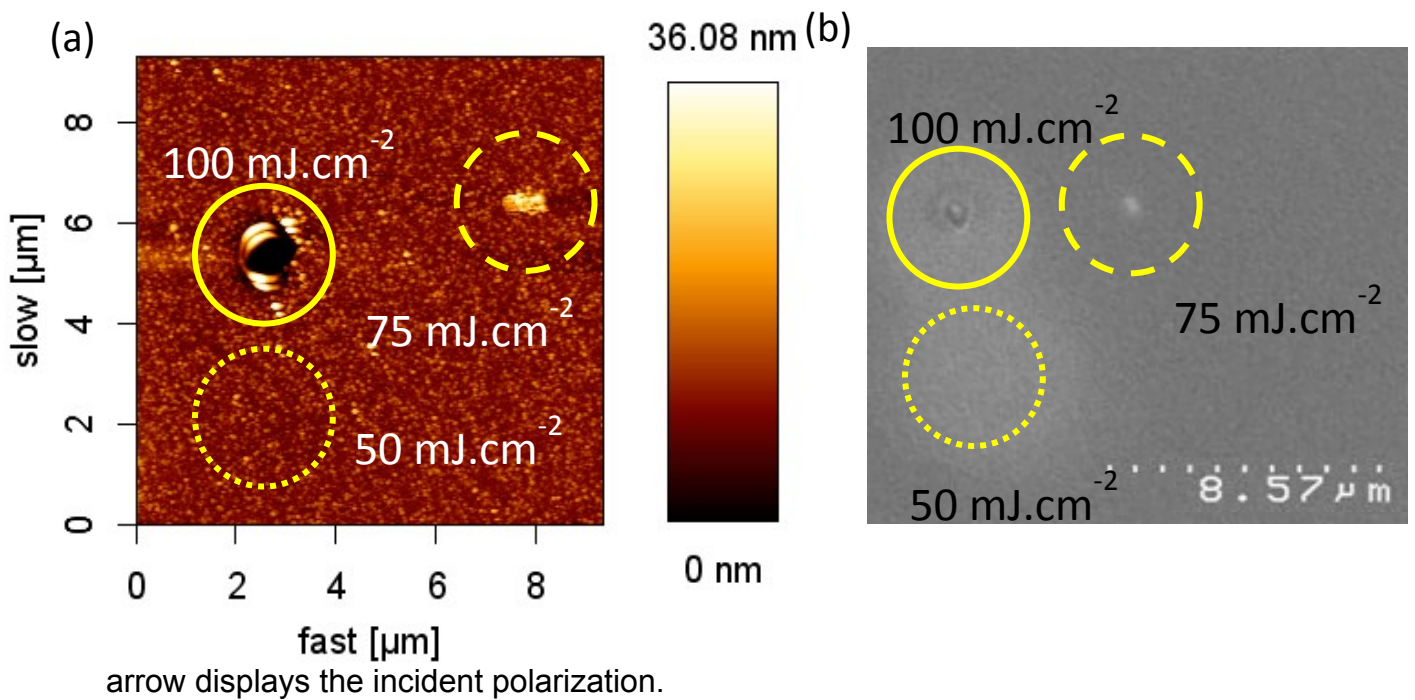
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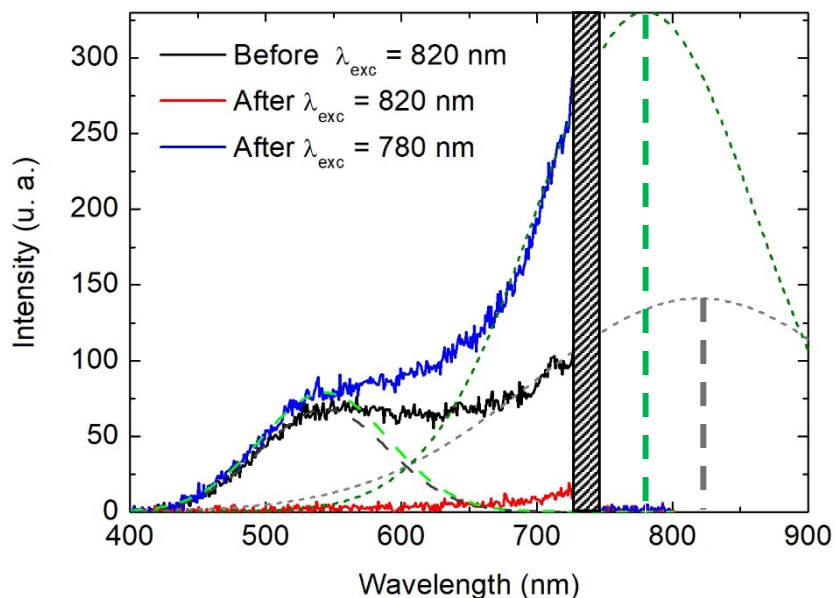


**Figure S1:** SEM (a), AFM (b) and TPL (c) characterization of the same area. The white



**Figure S2:** AFM (a) and SEM (b) images of the same area of a « naked » ITO coated glass cover slide following focussed laser illumination at 800 nm with an incident

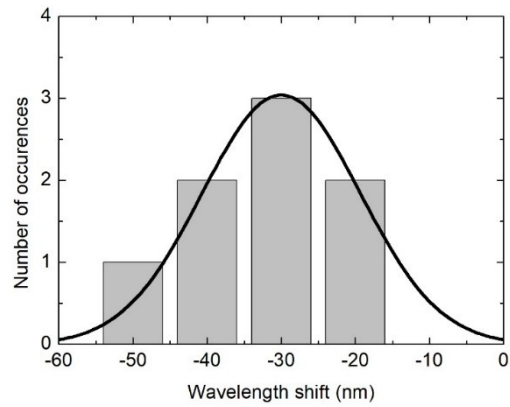
fluence of  $50 \text{ mJ.cm}^{-2}$  (yellow dotted circle),  $75 \text{ mJ.cm}^{-2}$  (yellow dashed circle) and  $100 \text{ mJ.cm}^{-2}$  (yellow circle).



**Figure S3:** TPL emission spectra of the same single GNR before (black line –  $\lambda_{\text{exc}} = 820 \text{ nm}$  resonant excitation) and after an “over-illumination” with a pulse energy density of  $125 \mu\text{J.cm}^{-2}$ . TPL spectra are recorded at reduced energy density ( $45 \mu\text{J.cm}^{-2}$ ) either at the initial resonance of the GNR ( $\lambda_{\text{exc}} = 820 \text{ nm}$  red line) or at the “new” resonance resulting from the “over-illumination” process ( $\lambda_{\text{exc}} = 780 \text{ nm}$ , blue line). The hatched area represent the wavelength above which filters are used experimentally to cut the exciting laser beam. The spectra are corrected from the wavelength sensitivity of the CCD camera (Andor DU401-BR-DD).

The dashed and dotted lines in green and cyan correspond to the visible (dashed) and IR (dotted) contribution in the TPL spectrum excited at  $820 \text{ nm}$  and  $780 \text{ nm}$  (black and blue lines), respectively.

The spectral analysis of the TPL evidences two emission bands peaks: in the visible and in the infrared (IR), these two bands being directly linked to the GNR transverse and longitudinal plasmon resonances, respectively (please see Molinaro et al. JPCC 2016). The visible part of the TPL spectrum can be fitted using a Gaussian dependence, the IR part of the TPL being deduced after subtracting this fitted visible band to the full experimental emission spectrum. What can be seen from figure S3, is that the visible band does not shift with the changes of the nanorod following over-illumination unlike the IR band which is clearly shifted to the blue after over-illumination, in direct link with the shift of the longitudinal resonance revealed in figure 4 from the changes in TPL intensity.



**Figure S4:** Histogram of the shift of the resonance wavelength of single GNRs immobilized onto plain glass substrates following their high power resonant illumination (pulse energy density of  $125 \mu\text{J}\cdot\text{cm}^{-2}$  at each rod). A Gaussian distribution is extrapolated from these data (black line).