ADDITIONAL SUPPLEMENTARY INFORMATION

Surface Plasmon Enhanced up-conversion from NaYF₄:Yb/Er/Gd Nano-Rods

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Experimental setup for UC lifetime

The emission spectra were obtained under 980 nm continuous wave laser excitation with a fixed power density of 200 W/cm². The illumination area was about 0.05 mm². The laser beam was incident normally onto the UC NRs covered AuNPAs sample, then, the fluorescence emission was collected with a microscope and spectrograph coupled CCD camera.



Figure SI-1 (a) Schematic of experiment setup for the UC emission and (b) the lifetime measurement setup.



Figure SI-2 (a) Normalized extinction spectra of the UC NRs film coated AuNPAs (500 nm and 550 nm periodicity, respectively), calculated from the experimental transmittance spectra. UC emission spectrum is shown as an insert (orange color) for comparison. The laser excitation wavelength was at 980 nm (indicated as a vertical line). **(b)** FDTD calculated extinction spectra as a function of the grating constant of AuNPAs in a dielectric NaYF₄ film (n=1.2) on the ITO (n=1.65) glass substrate (detailed simulation information see the method section).



Figure SI-3 (a) Lifetime measured from monochromatic UC green (from 520 nm to 570 nm) emission with different AuNPA periodicity; **(b)** Lifetime measurement for monochromatic UC red (from 640 nm to 690 nm) emission with different AuNPA periodicity; Instrument response factor (IRF), and statistic regular fitting residual and UC reference are also included.



Figure SI-4 The far field profiles of FDTD-calculation of green (544 nm) and red (661 nm) emission for 350 nm and 550 nm period of AuNPA, respectively.