Supplementary Information

Selective turn-on and modulation of resonant energy transfer in single plasmonic hybrid nanostructures

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Fig. S1. Spectroscopy of double-functionalized silica nanospheres. (a, c) Two examples of fluorescence spectra of silica nanospheres functionalized with donor and acceptor molecules, excited at 568 nm with two orthogonal polarizations (blue and red). (b, d) The same fluorescence spectra as in (a) and (c), respectively, normalized at the peak emission wavelength of the donor.



Fig. S2. Fluorescence spectra of a single donor-only functionalized gold nanorod excited at 568 nm with light polarized parallel to the long axis of the nanorod (blue) and perpendicular to it (green).



Fig. S3. (a) Fluorescence spectrum of a single donor-only functionalized gold nanorod excited at 568 nm (red) and background fluorescence from a bare unfunctionalized gold nanorod (blue). (b) Fluorescence spectra of bulk solutions of donor (blue), acceptor (green) and acceptor x 17 (red) excited with 568 nm. The spectra were measured under the microscope, and the concentrations of the dyes and excitation powers were kept constant.



Fig. S4. Two-dimensional plot of emission spectra from a FRET pair-functionalized gold nanorod as a function of an angle between the polarization of excitation light and the long axis of the nanorod.



Fig. S5. Field-enhancement FDTD calculations. (a, b) Distribution of electric field enhancement around a gold nanorod excited with light polarized parallel (a) and perpendicular (b) to its long axis upon excitation with 568 nm. The polarization is indicated by the arrows. (c) Scattering spectrum from a single gold nanorod for incident light polarized parallel with its long axis. Symbols - experimental data; solid lines - simulation. (d) Spectral dependence of near-field enhancement factor calculated at a distance of 3 nm away from a tip.



Fig. S6. Experimental results and theoretical simulations of the energy transfer on single hybrid GNRs. Symbols - fluorescence spectra of FRET pair-functionalized gold nanorods excited with 568 nm, for the excitation polarization parallel to the long axis of the nanorod (blue) and perpendicular to it (red). Solid lines - fitting of the experimental data using modified FRET theory.