Electronic Supplementary Material (ESI) for Analyst.

A plasmonic fluorescent ratiometric temperature sensor for self-limiting hyperthermic applications utilizing FRET enhancement in plasmonic field

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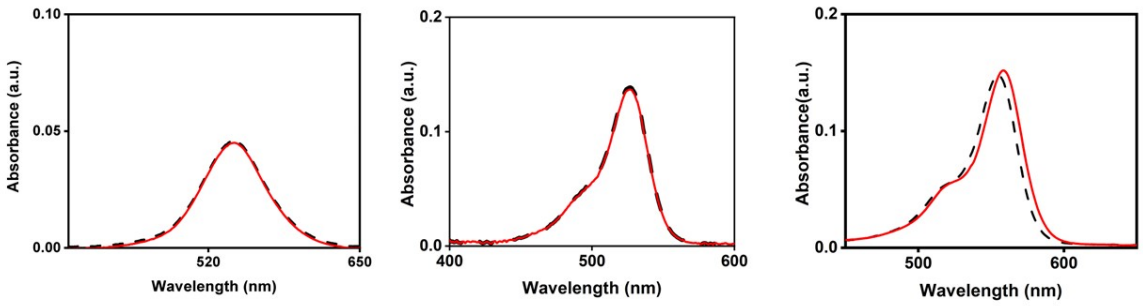

Figure S1. Absorbance spectra of octahedral gold nanopaticles before (dash) and after (solid) addition of 1% aqueous HF solution (left). Absorbance spectra of R6G (5µM) (middle) and RB (right) in DI water before (dash) and after (solid) addition of 1% aqueous HF solution.

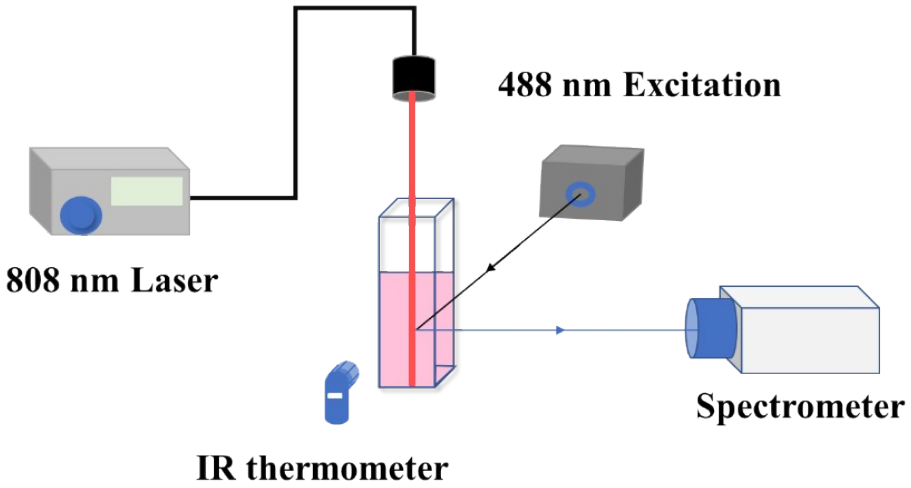

Figure S2. Schematic of the set up for the photothermal experiments.

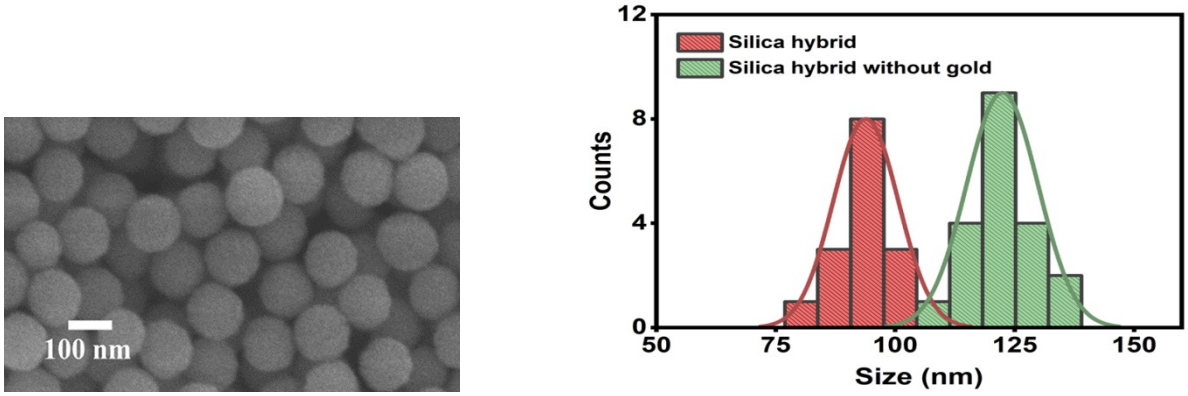

Figure S3. The SEM images of dye doped silica nanoparticles without the gold core. Particle size distribution of the nanoparticles along with the hybrid particles (with gold core) calculated from the SEM images.

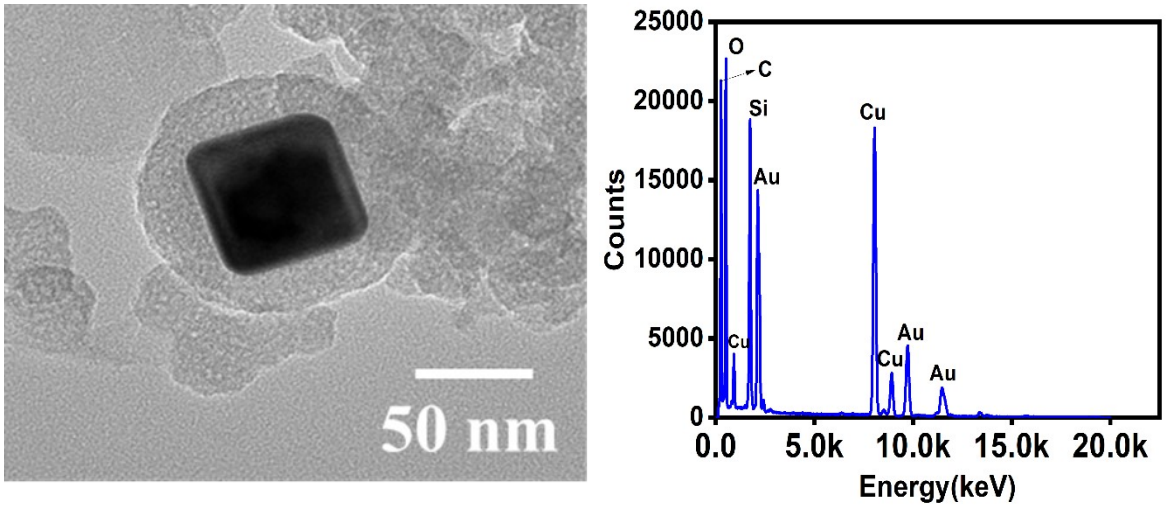

Figure S4. TEM image of the core shell particle. The energy dispersive spectrum of the image is also provided. The presence of copper is from the copper grid.

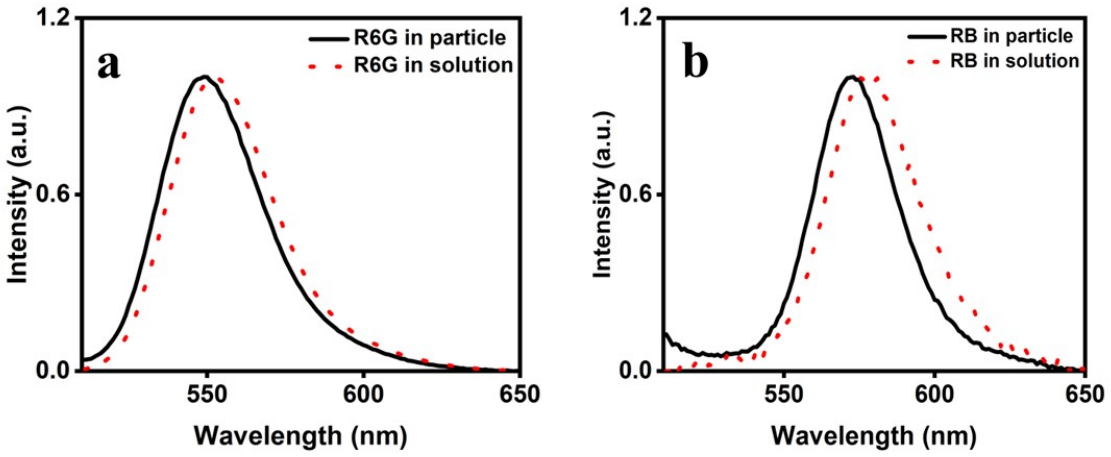

Figure S5. Normalized fluorescence spectra of single dye doped hybrid particles a) R6G (HyR6G), b) RB (HyRB) before and after addition of HF. The blue shift in fluorescence for encapsulated dye can be seen.

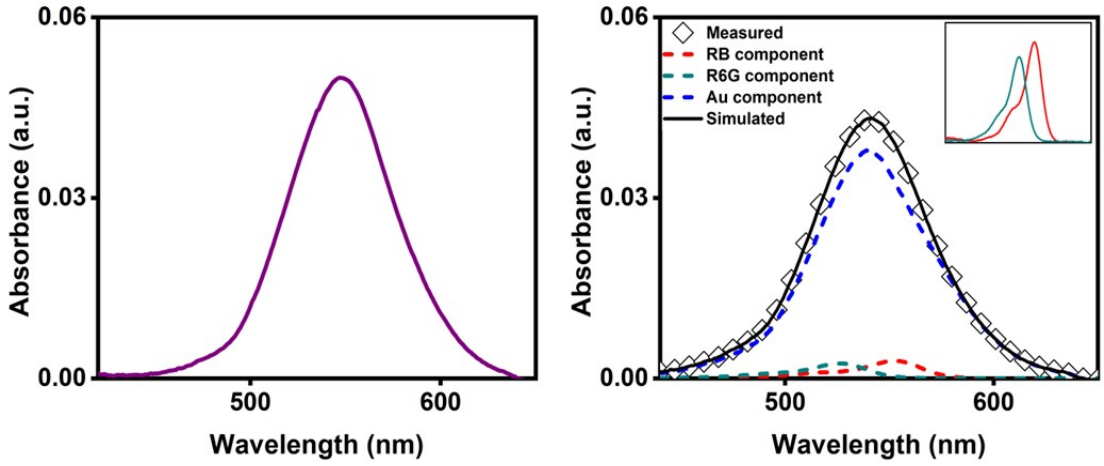

Figure S6. Absorption spectra of hybrid nanoparticles (Hy1) (left). (b) Absorption spectra after the addition of HF to the solution and its linear decomposition into rhodamine 6G, gold nanoparticle and rhodamine B components. The simulated total spectrum is also given as fit to the measured spectrum (scatter). The gold component dominates the absorbance of the solution and the portion of the spectrum containing rhodamine B and rhodamine 6G decomposition is given in the inset for clarity.

FRET Efficiency calculation

R6G Fluorescence brightness of nanoparticles containing only R6G (HyR6G) - 20

Number of R6G encapsulated in a HyR6G particle - 14

R6G Fluorescence brightness of Hy1 - 5.83

Number of R6G encapsulated in a Hy1 particle - 16

$$E_{Hy1} = 1 - \frac{5.83}{\left(\frac{20}{14}\right) \times 16} = 0.75$$

Similarly,

$$E_{Hy2} = 1 - \frac{4}{\left(\frac{20}{14}\right) \times 14} = 0.80$$

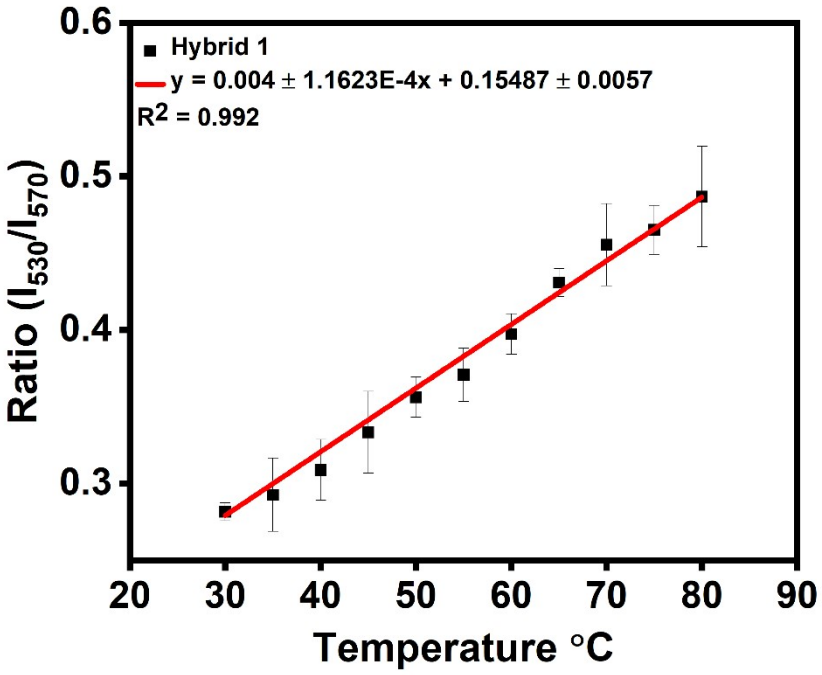

Figure S7. Temperature calibration curve till 80 °C.