Increasing the efficiency of lanthanide luminescent bioprobes: bioconjugated silica nanoparticles as markers for cancerous cells

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Supporting Information

3 pages

Bioconjugates with avidin (NP-avidin). 2 mg of NH_2-functionalized NPs (obtained using a 10 mM solution of $[Eu_2(L^{C2})_3]$) were washed twice with 2 mL of PBS (phosphate buffered saline, 0.01 M, pH 7.4) and then suspended in 2 mL of 7% glutaraldehyde solution in PBS, the reaction was run during 1h 30 min at rt under continuous mixing. After washings with PBS (2×200 mL), NPs were suspended in 1 mL of PBS and 1 mL of 0.5 mg/mL aqueous solution of avidin (A9275 Sigma) was added (2.5-fold excess of the calculated *S* value). The resulting solution was mixed for 3 h at rt, NPs were washed with PBS (3×200 mL), suspended in quenching solution (30 mM glycine in PBS containing 0.5% bovine serum albumin, BSA) and reacted for 30 min. After additional washings with PBS (3×200 mL) NPs were suspended in PBS with 0.05% BSA and stored at 4ºC before use.

The amount *S* of avidin needed to achieve surface saturation can be estimated by the following equation: $S = (6/\rho_S \cdot d)\cdot(C)$, where *S* is in units of mg of protein/g of NP, ρ_S is density of the NP (taken as 1.95 g/cm^3 for silica), *d* the mean diameter (μm) and *C* the capacity of microsphere surface for a given protein, ~3 and 2.5 mg/m^2 for BSA (MW = 65 kD), and bovine IgG (MW = 150 kD), respectively. The capacity for avidin was taken as 3 mg/m^2 for a molecular weight of 66 kD, so that *S* = 103 mg of avidin/g of NP.

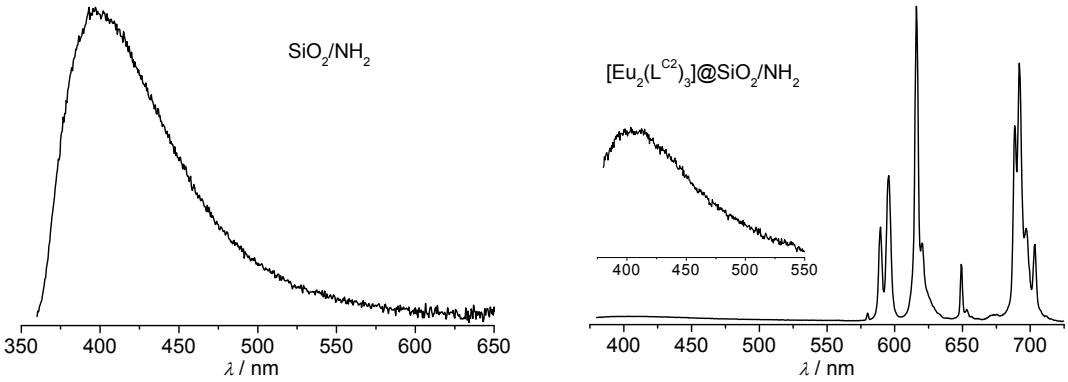

Figure S1. Luminescence spectra of (left) un-doped SiO_2/NH_2 and (right) $[Eu_2(L^{C2})_3]@SiO_2/NH_2$ nanoparticles (λ_{ex} = 300–330 nm, T = 295 K).

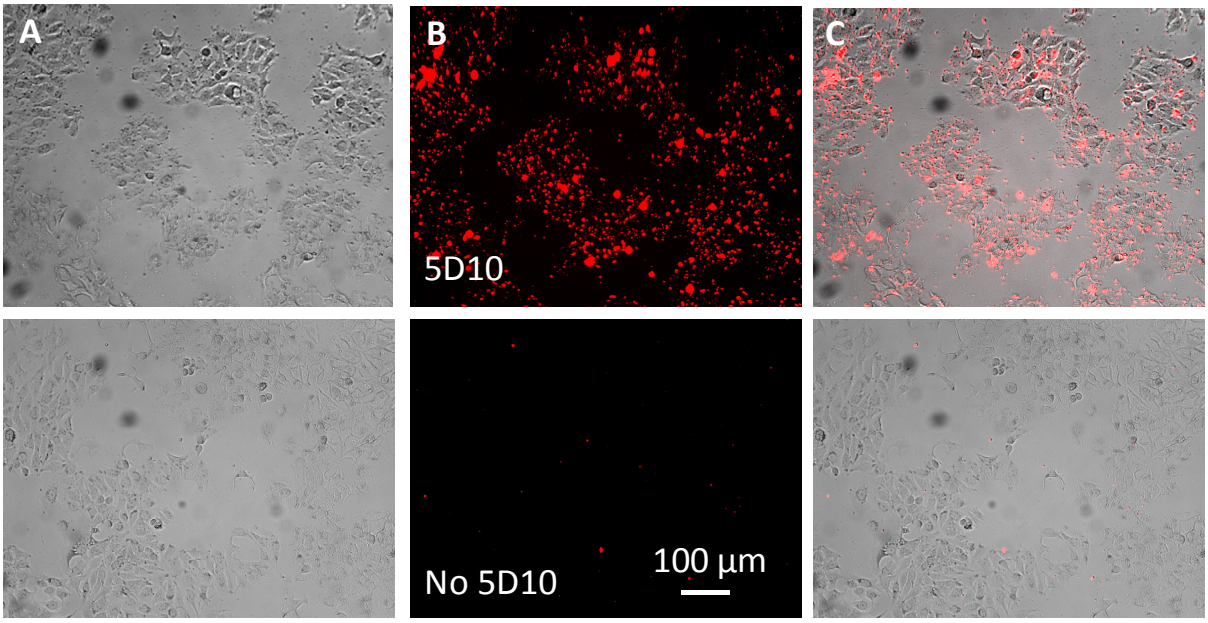

Figure S2. Immunoluminescent detection of 5D10 Ag on MCF-7 cells by 5D10 with the **NP-IgG** probe: (A) bright field, (B) luminescence and (C) merged images.