ELECTRONIC SUPPLEMENTARY INFORMATION FOR

Photostable phosphorescent polymer nanospheres for high sensitivity detection

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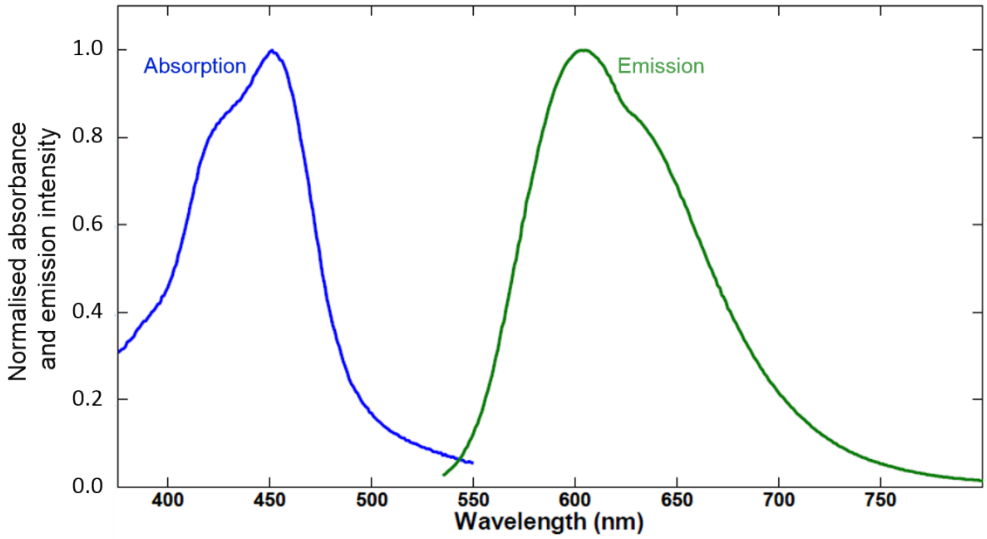

Figure SI1: Normalised absorption and photoluminescence emission spectra for free $Ru(dpp)_3Cl_2$ dye in deoxygenated ethanol. Note, ethanol was selected as the solvent because the dye is only sparingly soluble in water.

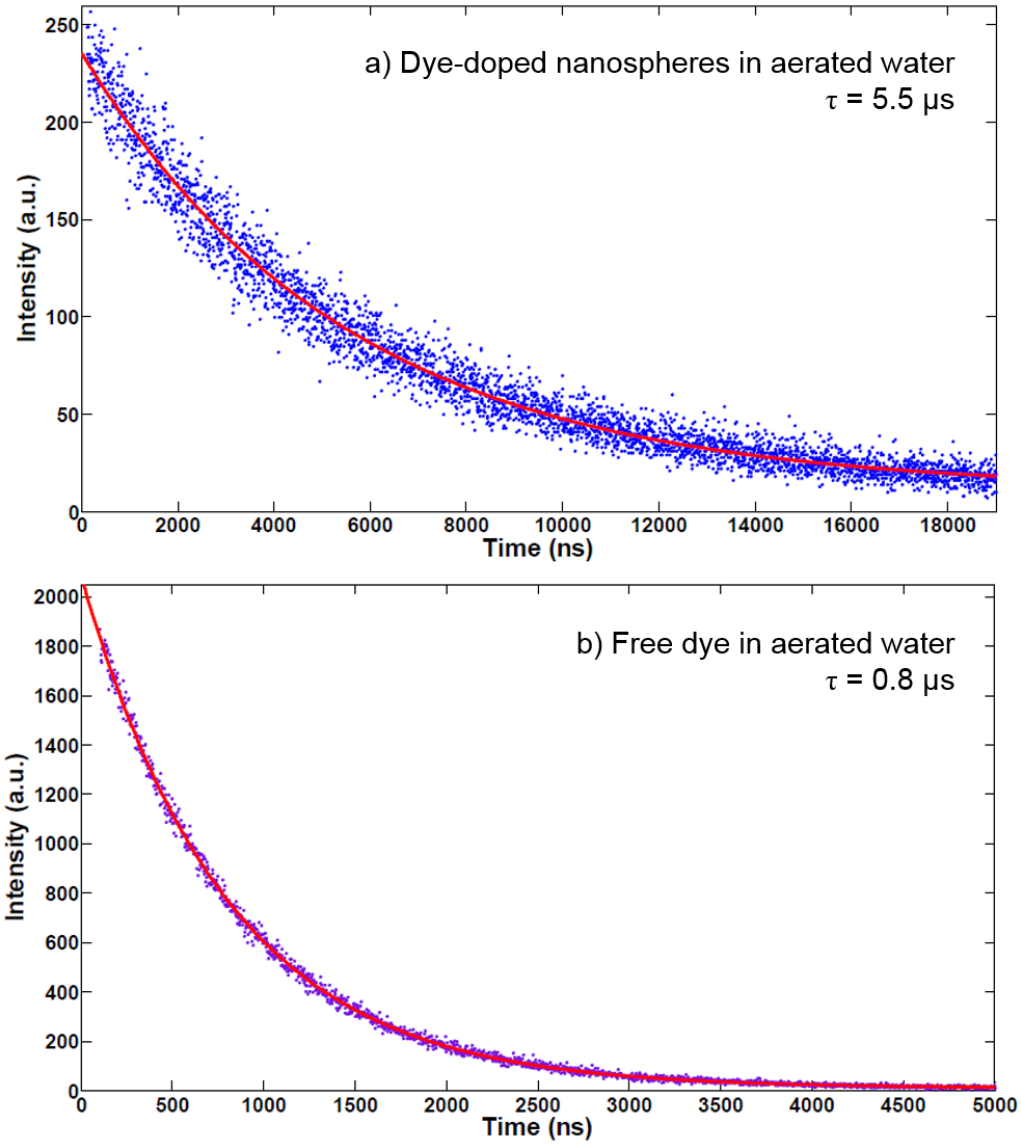

Figure SI2: Phosphorescence decay curves for (a) crosslinked nanospheres doped with $Ru(dpp)_3Cl_2$ and (b) free $Ru(dpp)_3Cl_2$ dye. Traces were recorded in aerated deionized water. The solid lines show fits to a monoexponential decay function from which the lifetime τ was determined.

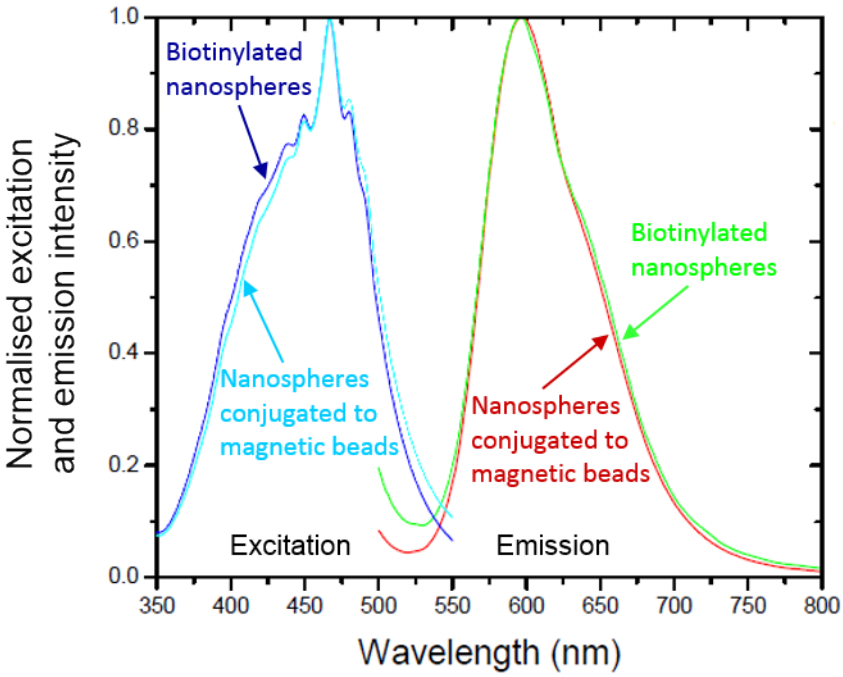

Figure SI3: Normalised excitation and emission spectra of biotinylated nanospheres in water before and after conjugation to streptavidin-coated magnetic beads, showing minimal changes in the spectral properties.

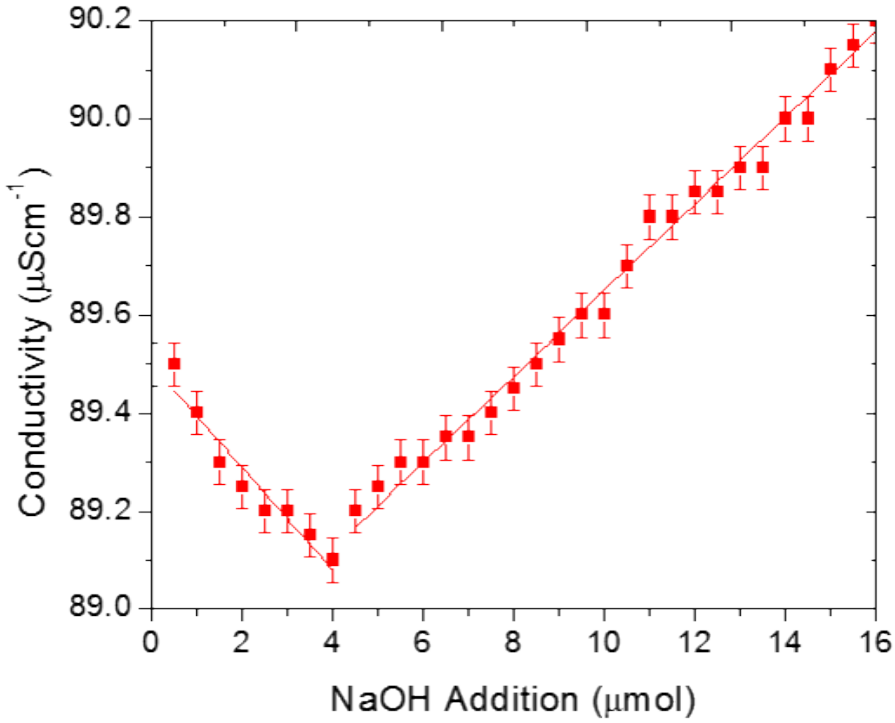

Figure SI4: Conductometric titration curves[1-3] obtained by adding 1 ml of 0.05 M NaOH to 49 ml of nanosphere solution (containing 114.5 mg dry mass). The measured conductance falls linearly with the volume of added NaOH solution until reaching a minimum value at 76.8 µl (3.84 µMol), beyond with it starts to rise. The observed behaviour is consistent with low mobility Na^+ ions replacing fast-mobility H^+ ions from the surface carboxylic acid groups, and so causing a drop in conductivity until 'equivalence' is reached, beyond which the conductivity rises due to the increasing Na^+ concentration. Assuming only surface hydroxylic acid groups are accessible, taking the diameter of the (spherical) nanospheres to be 300 nm, and assuming a density of ~1 g/cm^3 for the host matrix, the number of surface groups per particle is found to be ~300,000 (equivalent to one surface carboxylic acid group per square nanometre).

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