Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Measuring Nanoparticle-Induced Resonance Energy Transfer Effect by Electrogenerated Chemiluminescent Reactions

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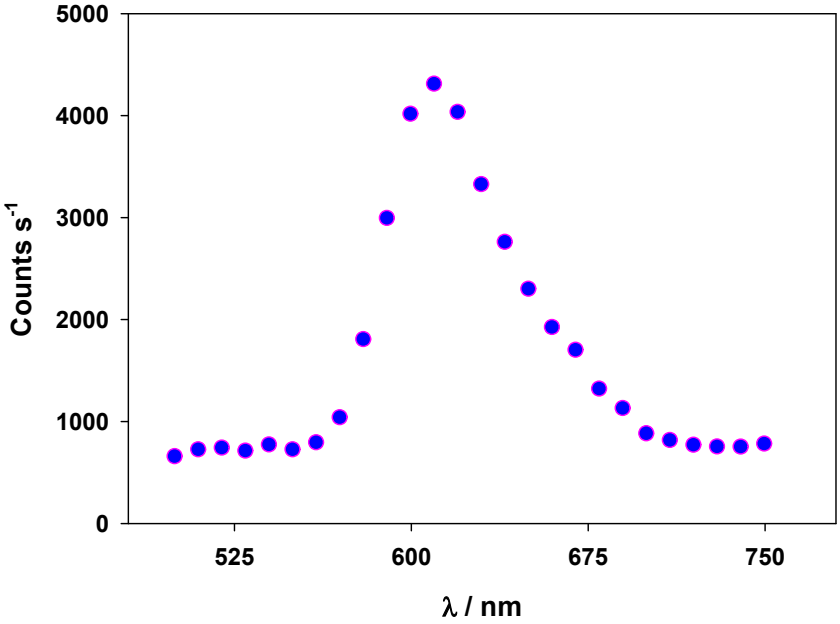
Figure S1. ECL spectra for $[Ru(bpy)_3]^{2+}$ + $C_2O_4^{2-}$ reaction in the presence of AuNPs. Scan rate: 10.0 mV s^{-1}. $7.5x10^{-8}$M [AuNPs], cacodylate buffer ($3.0x10^{-2}$ M [$NaCH_3AsO_2$] / $3.8x10^{-3}$ M [HCl] plus $6.2x10^{-3}$ M NaCl) pH 7.0. Ionic strength 0.040 M.



The ECL spectrum is identical to the photoluminescent spectrum, suggesting that the ECL reaction could follow the same mechanism in the absence as well as in the presence of NPs.

Figure S2. CV voltammogram for the $[Ru(bpy)_3]^{3+/2+}$ couple in $5.0x10^{-8}$ M AuNPs. cacodylate buffer, pH 7.0 ($[NaCH_3AsO_2]$ = $3.0x10^{-2}$ M, [HCl] = $3.8x10^{-3}$ M), $6.2x10^{-3}$ M NaCl. Ionic strength 0.040 M.

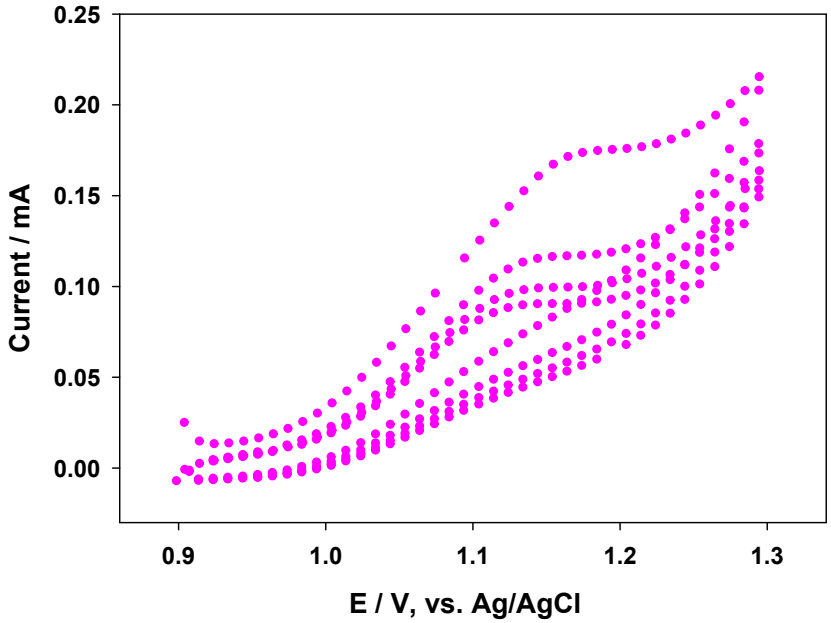


Figure S3. AFM photogram for Au@tiopronin at $1.0x10^{-8}$ M (top) and $8.0x10^{-8}$ M (bottom) in the absence of the $[Ru(bpy)_3]^{2+}$ complex and their corresponding histograms, cacodylate buffer pH 7.0.

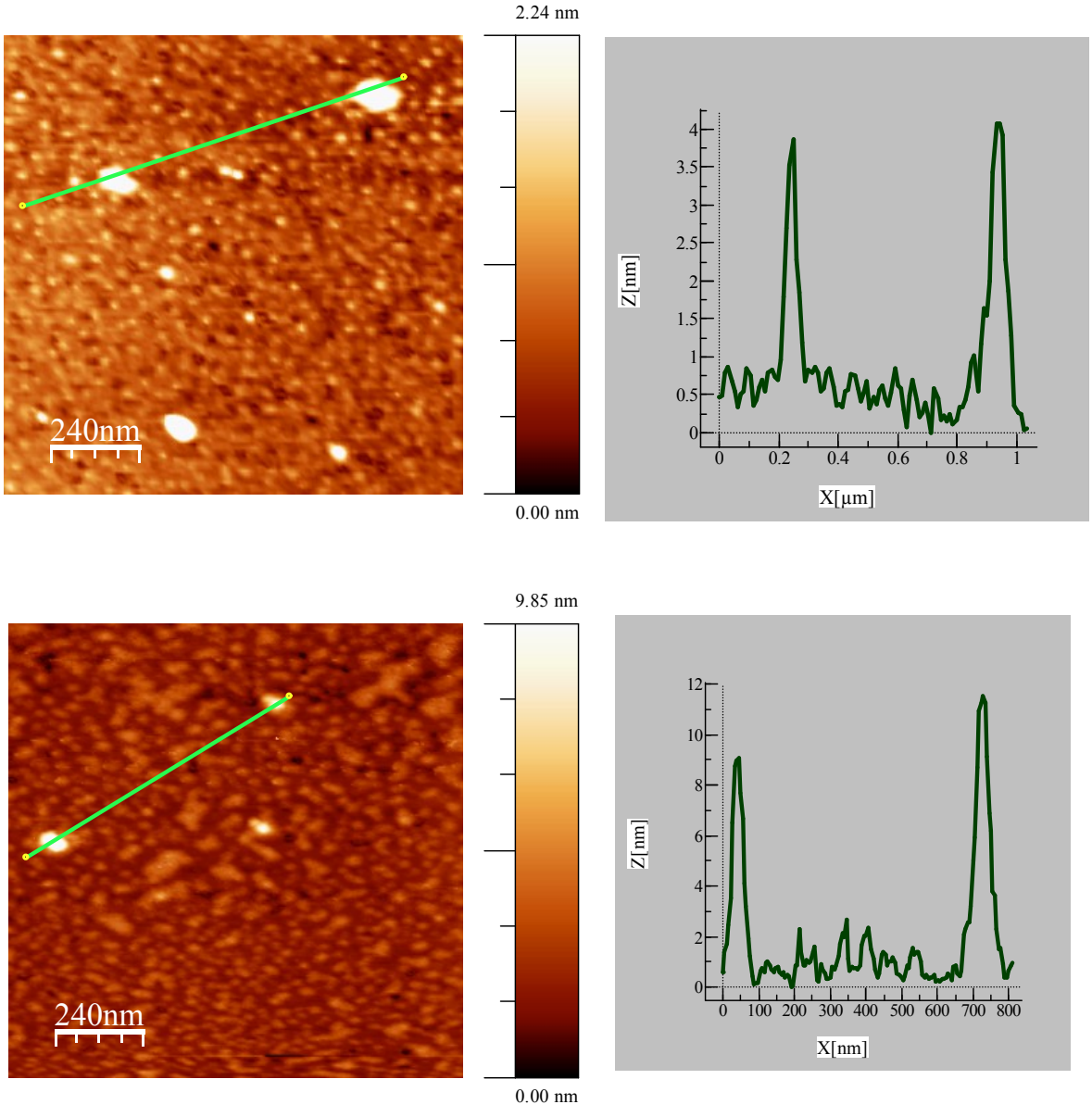
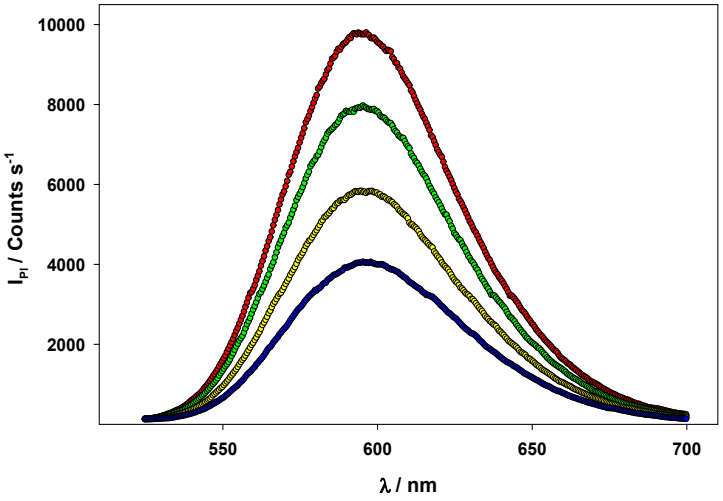


Figure S4 (A and B). Photoluminescent spectra of the $[Ru(bpy)_3]^{2+*}$ species as a function of the [Au@tiopronin], cacodylate buffer pH 7.0.

A) Excitation wavelength 453 nm. $2.0x10^{-6}$ M $[Ru(bpy)_3]^{2+}$. Red without NPs, green $4.0\ x10^{-7}$ M, yellow $1.0\ x10^{-6}$ M and blue $2.0x10^{-6}$ M AuNPs.



B) Excitation wavelength 500 nm. $2.0x10^{-4}$ M $[Ru(bpy)_3]^{2+}$. Black without NPs, pink $2.0x10^{-7}$ M, dark green $1.0x10^{-6}$ M, cyan $2.0x10^{-6}$ M, blue $3.0x10^{-6}$ M, yellow $3.5x10^{-6}$ M and red $4.0x10^{-6}$ M AuNPs.

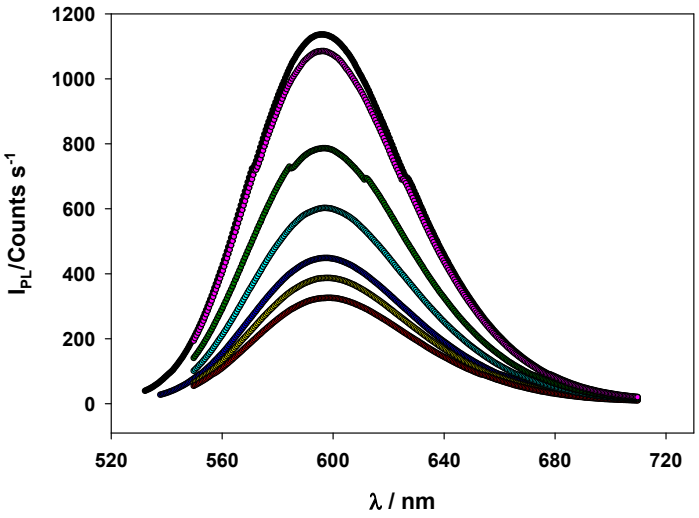
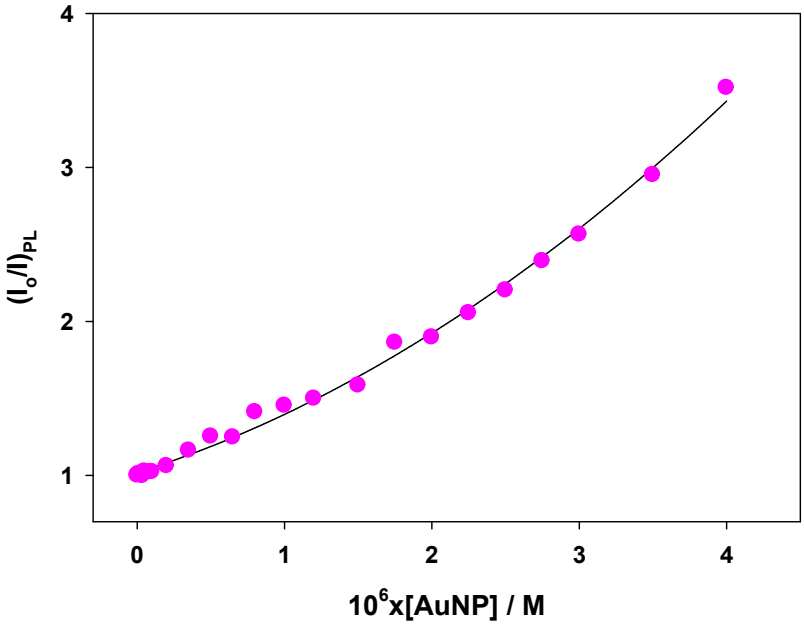


Figure S5. Stern-Volmer approach plots, with experimental data for the photoluminescent spectra in Figure S4(B), entire range.



Quadratic equation, taking into account static (K_S) and dynamic (K_D) quenching:

$$\left(\frac{I_o}{I}\right)_{PL} = 1 + (K_D + K_S)[AuNPs] + (K_D K_S)[AuNPs]^2 \qquad \textbf{(1S)}$$

Although the fit between experimental data and this equation was good, the results for K_S and K_D are not consistent.

Figure S6. Photoluminescent spectra of the $[Ru(bpy)_3]^{2+*}$ and AuNP* excited species. Red, $[Ru(bpy)_3]^{2+*}$ spectrum in the presence of the $8.0x10^{-8}$ M [AuNPs]. Blue, $[Ru(bpy)_3]^{2+*}$ spectrum in the absence of the AuNPs. Black, AuNP* spectrum. Green, sum of the $[Ru(bpy)_3]^{2+*}$ and AuNP* spectra. $4.0x10^{-7}$ M $[Ru(bpy)_3]^{2+}$, $8.0x10^{-8}$ M [AuNPs], cacodylate buffer pH 7.0.