Electronic Supplementary Material (ESI) for RSC Advances.

Electronic supporting information

Sensitive and highly selective determination of vitamin B1 in the presence of other vitamin B complexes using functionalized gold nanoparticles as fluorophore

Sekar Shankar and S. Abraham John*

Center for Nanoscience and Nanotechnology
Department of Chemistry, Gandhigram Rural Institute
Gandhigram – 624 302, Dindigul, Tamilnadu, India.

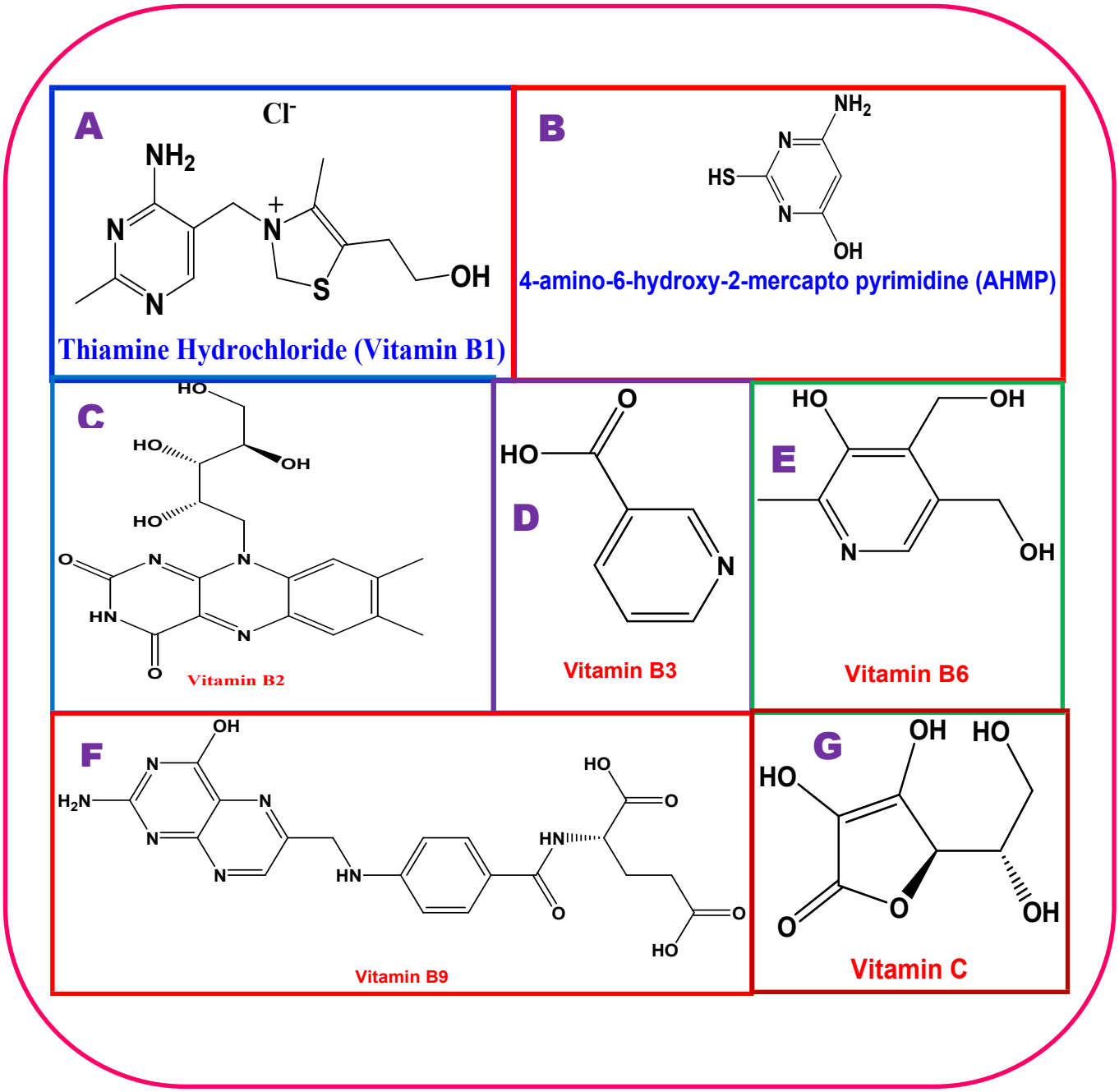

Chart S1. Structures of AHMP and vitamin B complexes.

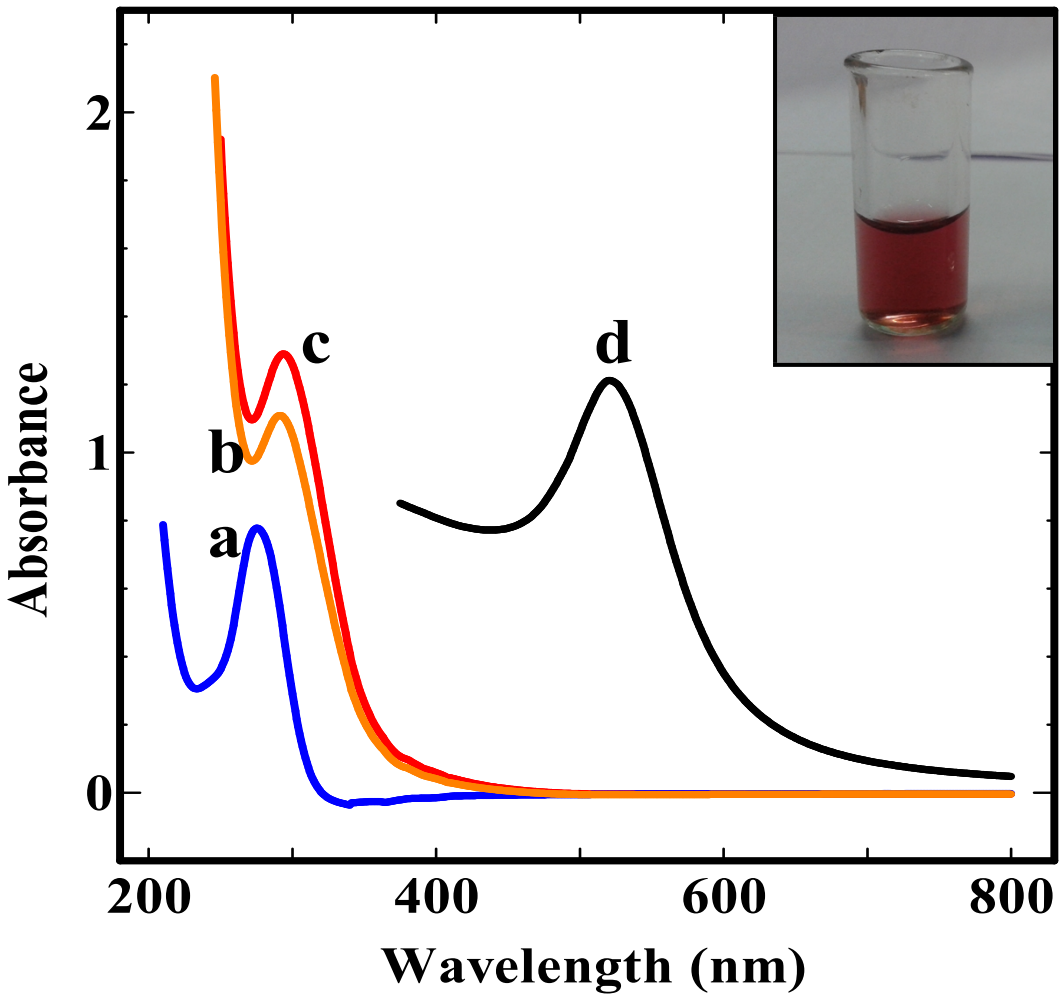

Fig. S1. Absorption spectra obtained for (a) AHMP, (b) $HAuCl_4$ and after the addition (c) $HAuCl_4$ to AHMP and (d) $NaBH_4$ to a mixture of $HAuCl_4$ and AHMP**.** **Inset**: Photograph of synthesized AHMP-AuNPs .

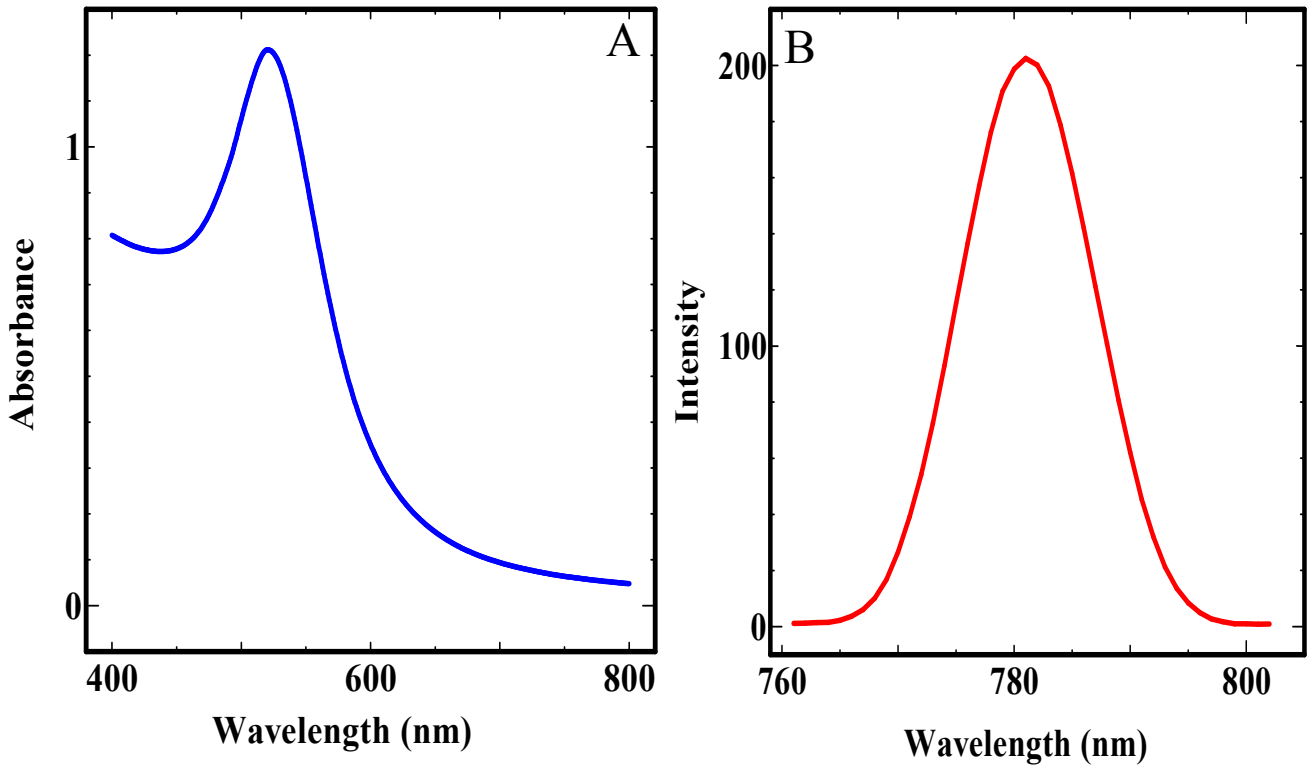

Fig. S2. UV-visible (A) and emission spectra (B) of AHMP-AuNPs (λ_{ex}: 520 nm; λ_{em}: 781 nm).

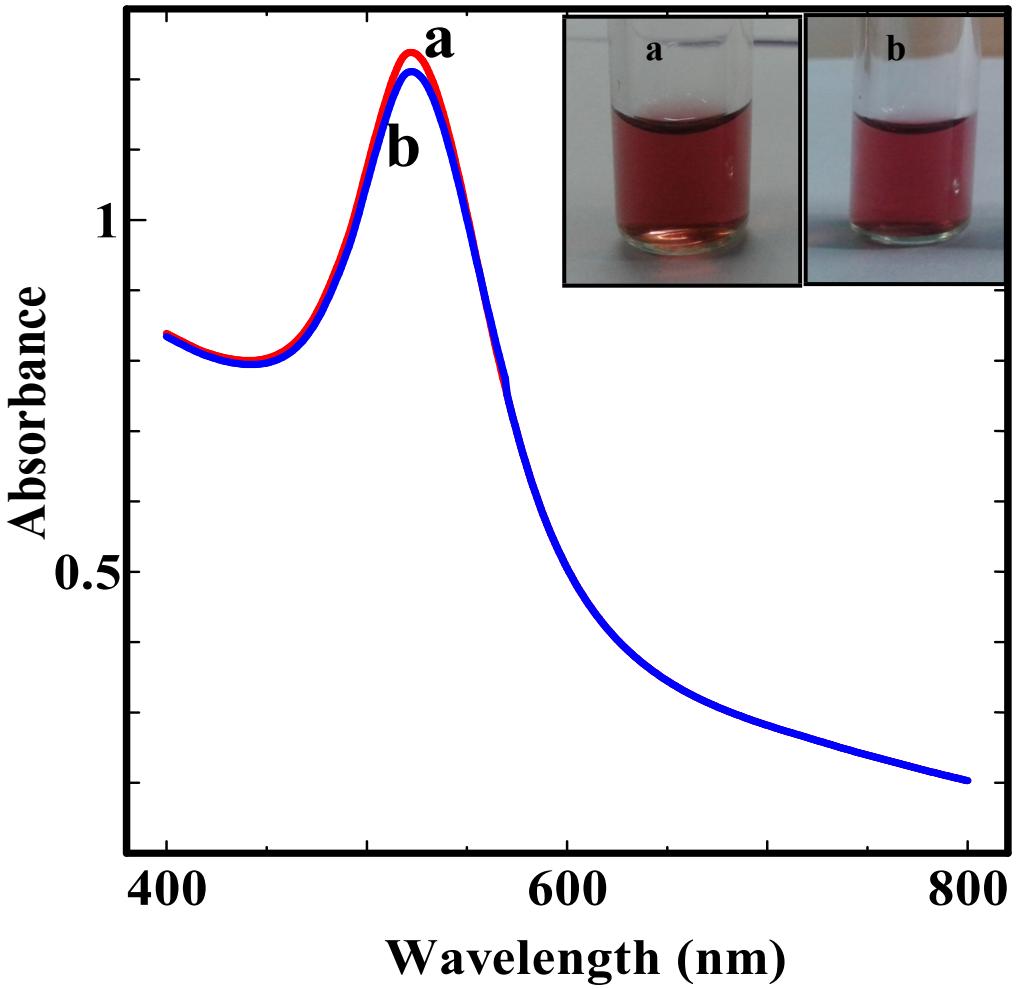

Fig. S3. UV-visible spectra of AHMP-AuNPs (a) freshly prepared, (b) after the three month. **Inset**: Corresponding photographs of UV-visible spectra (a) freshly prepared, (b) after the five month.

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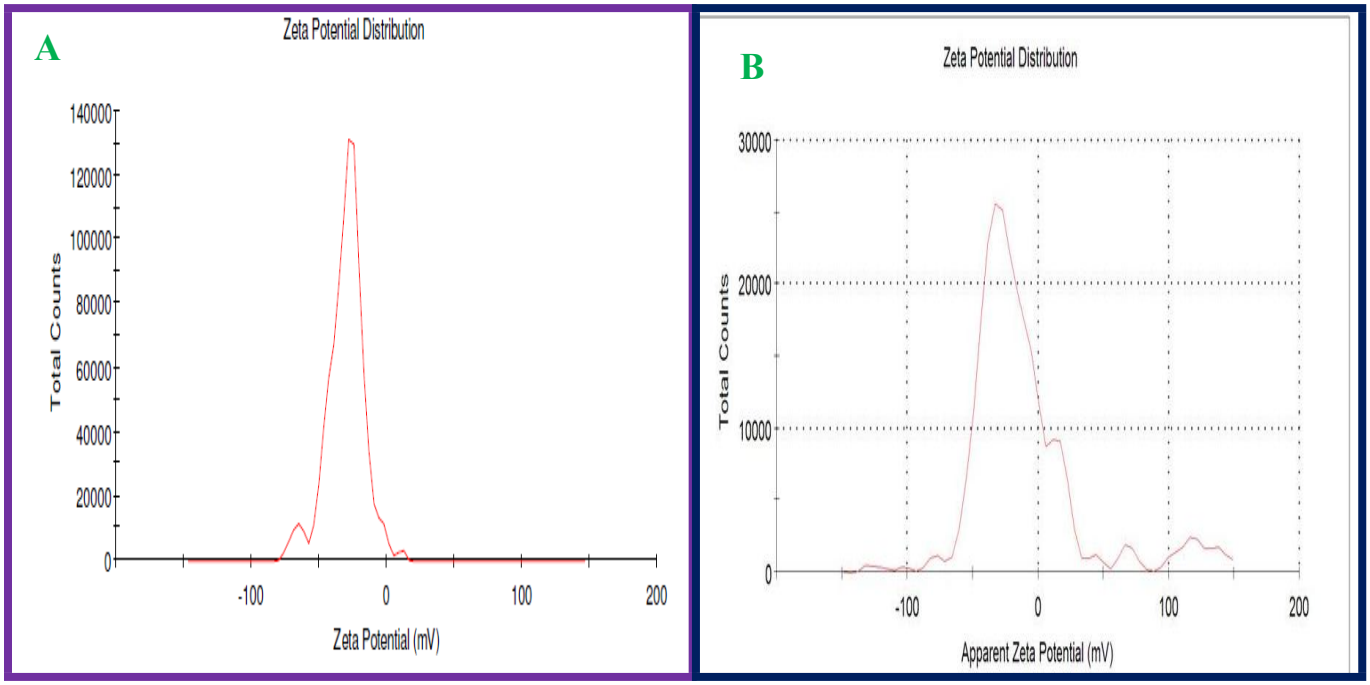


Fig. S4. Zeta potential measurement of AHMP-AuNPs (A) before and (B) after the addition of 1.20×10^{-6} M thiamine.

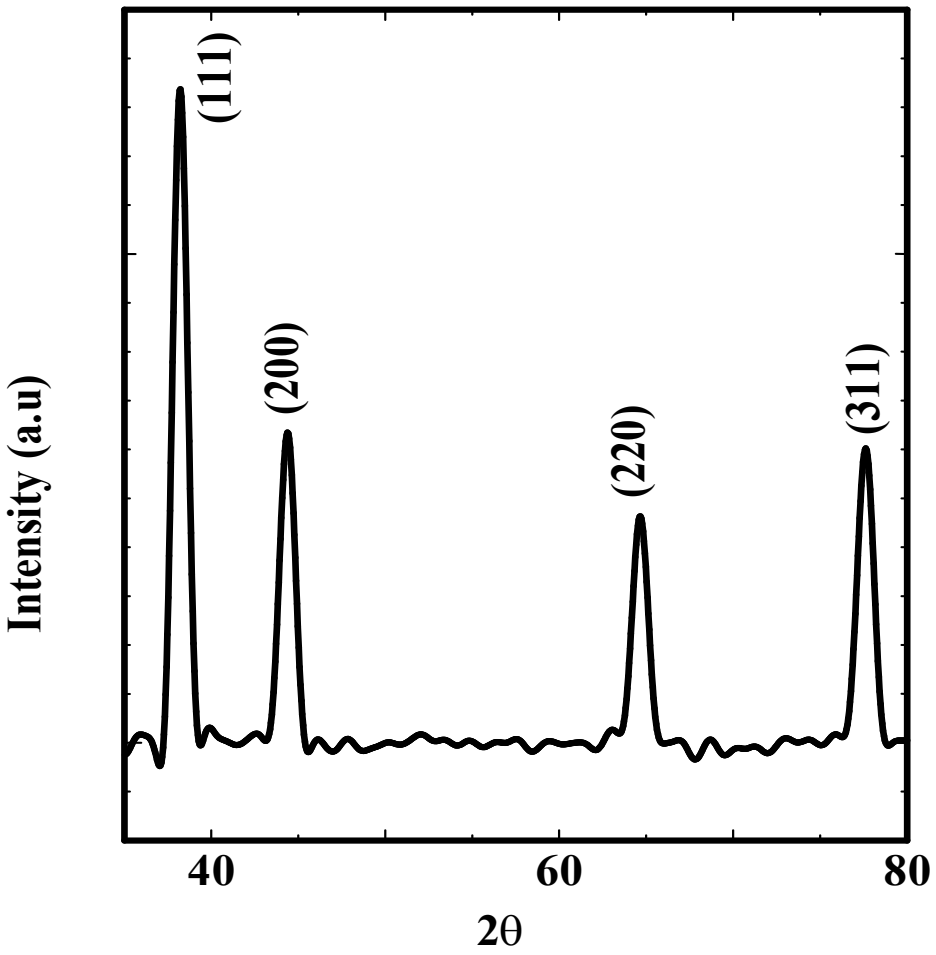


Fig. S5. X-ray Diffraction pattern of AHMP-AuNPs.

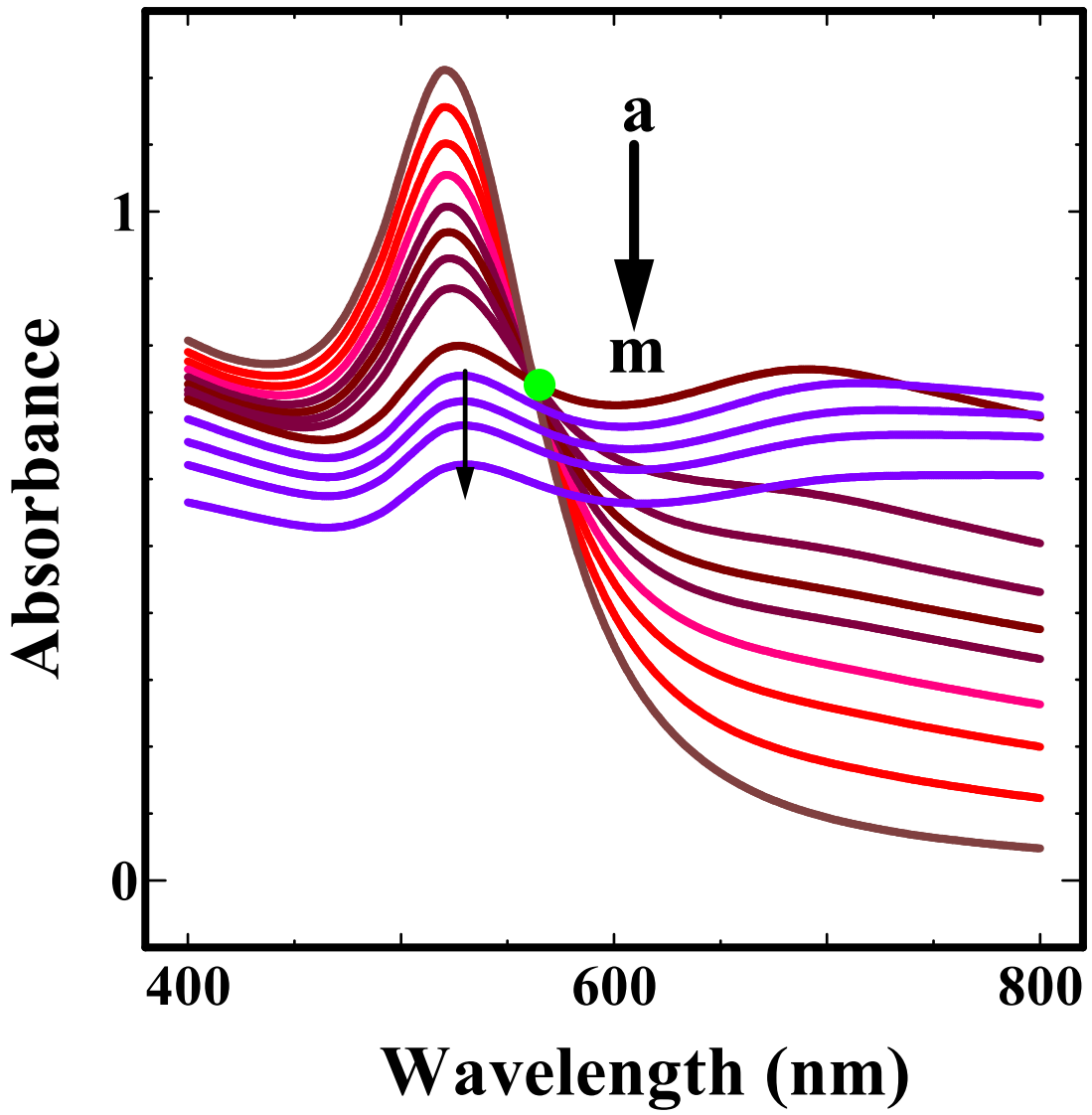


Fig. S6. UV-vis spectra of AHMP-AuNPs in different concentrations of thiamine: (a) 0, (b) 0.15, (c) 0.30, (d) 0.45, (e) 0.60, (f) 0.75, (g) 0.90, (h) 1.05, (i) 1.20 , (j) 1.35, (k) 1.50, (l) 1.65 and (m) 1.80×10^{-6} M.

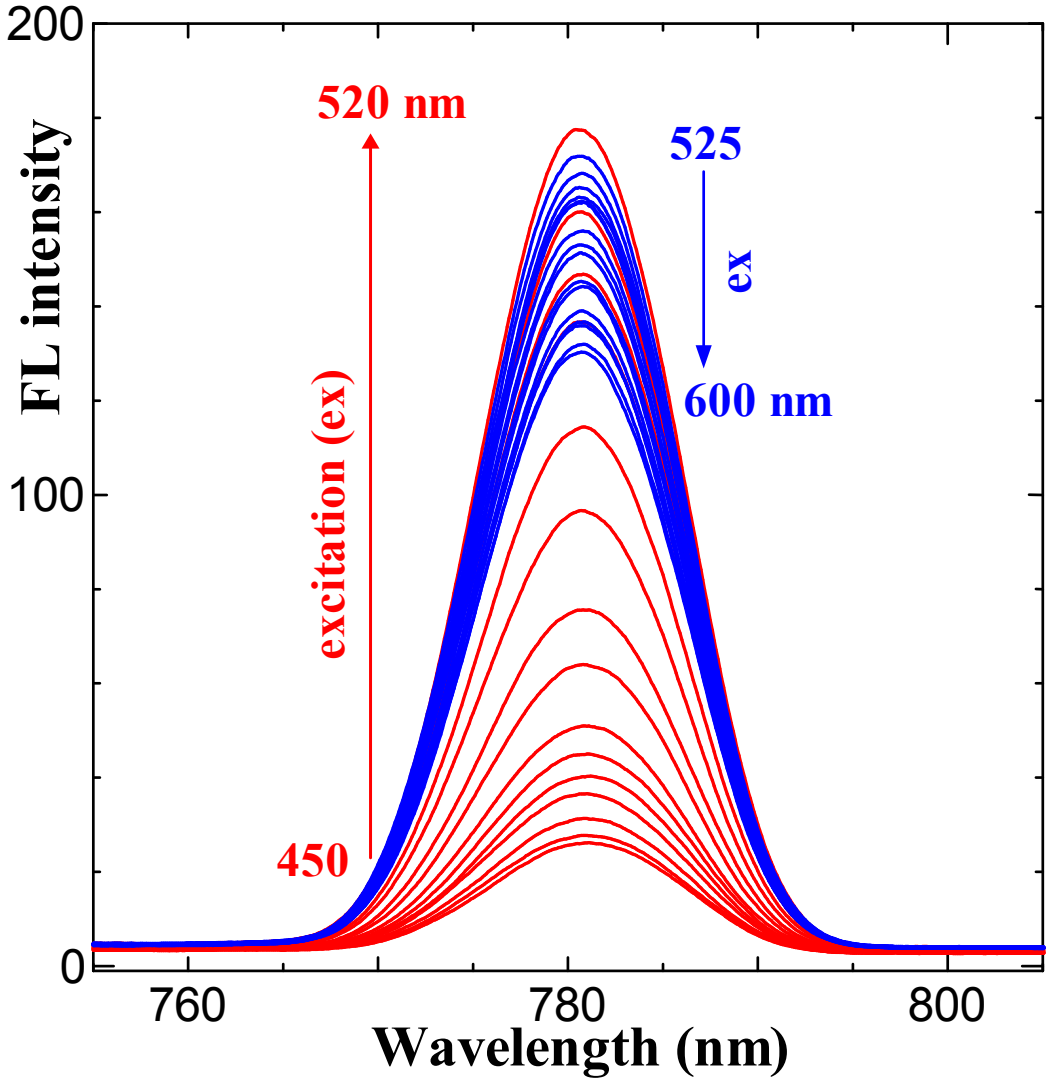


Fig. S7. Emission spectra of AHMP-AuNPs by varying excitation wavelength from 450 - 600 nm (interval 5 nm).

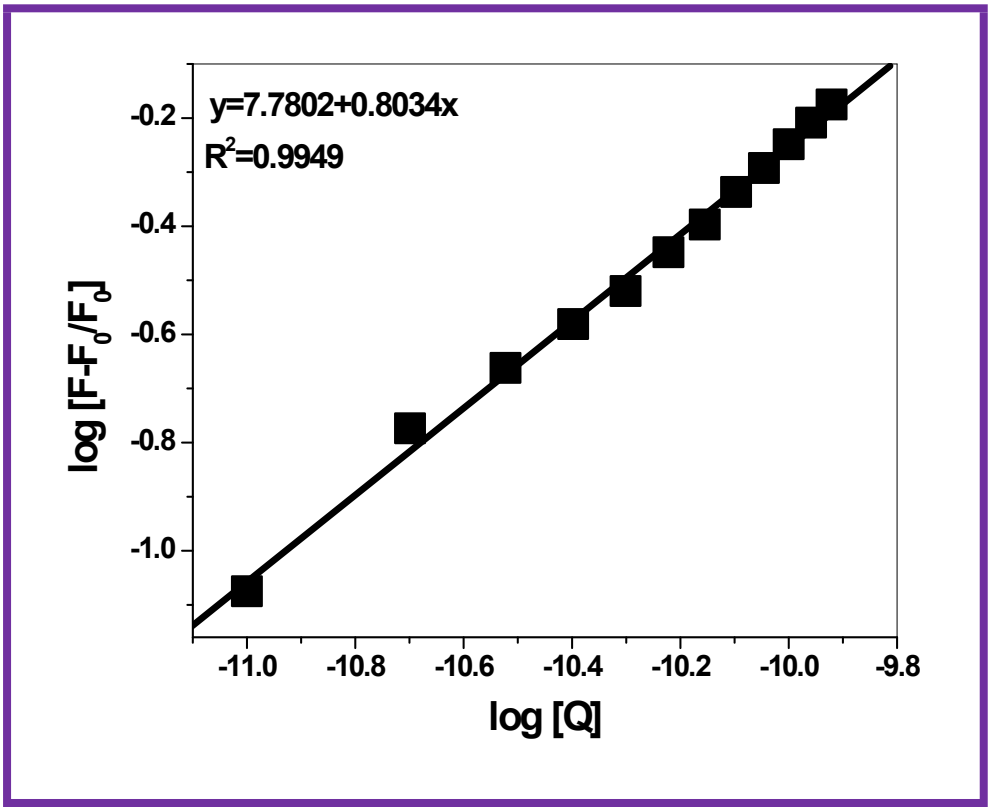


Fig. S8. Plot for binding constant of AHMP-AuNPs with thiamine.

Table S1. DFT calculation of AHMP and AHMP-AuNPs

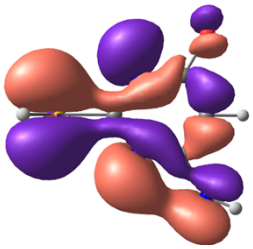
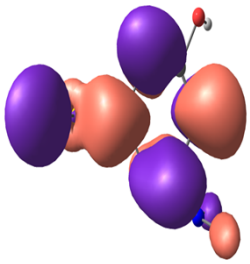
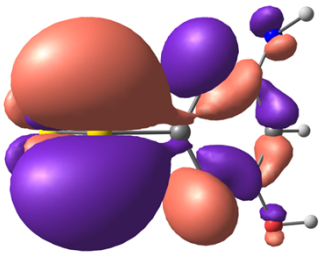
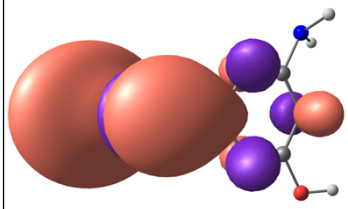
Compound	HOMO	LUMO	Energy gap (eV)
AHMP			4.8731
AHMP-AuNPs			2.4990

Table S2. Comparison of thiamine limit of detection and linear range obtained in the present work with reported methods

Methods	Medium	Linear range	Limit of detection	Ref.
Spectrofluorimetry	alkaline	1×10^{-4} - 1×10^{-8} M	4.3 nM L^{-1}	2
Spectrofluorimetry	water	3.3 µM – 8.3 nM	2.6 nM L^{-1}	14
Spectrofluorimetry	alkaline	1.9×10^{-4} – 2.7×10^{-7} M	5×10^{-8} M L^{-1}	15
HPLC	methonal	5×10^{-7} M - 5×10^{-10} M	1×10^{-10} M L^{-1}	20
Capillary electrophoresis	water	Not reported	0.05 µg ml^{-1}	23
Square wave voltammetry	water	2.2 µM - 1×10^{-8} M	5.5 nM L^{-1}	24
Chemiluminescence	water	4×10^{-5} - 1×10^{-7} M	4.8 nM L^{-1}	43
Spectrofluorimetry	water	10 – 120 pM	6.8 fM L^{-1}	present method

Table S3. Determination of thiamine in human blood serum samples (n=5)*

Samples	thiamine spiked (ng L^{-1})	thiamine found (ng L^{-1})	RSD	Recovery (%)
Sample 1	10	9.9 ± 0.1	0.55	99.4
Sample 2	20	19.9 ± 0.1	0.42	99.6

* Five replicate measurements