Synthesis of Monometallic (Au and Pd) and Bimetallic (AuPd) Nanoparticles Using Carbon Nitride (C_3N_4) Quantum Dots via the Photochemical Route for Nitrophenol Reduction

Pragati Fageria[a], Shravan Uppala[a], Roshan Nazir[a], Subhashis Gangopadhyay[b], Chien-Hsiang Chang[c], Mrinmoyee Basu[a] and Surojit Pande[*a]

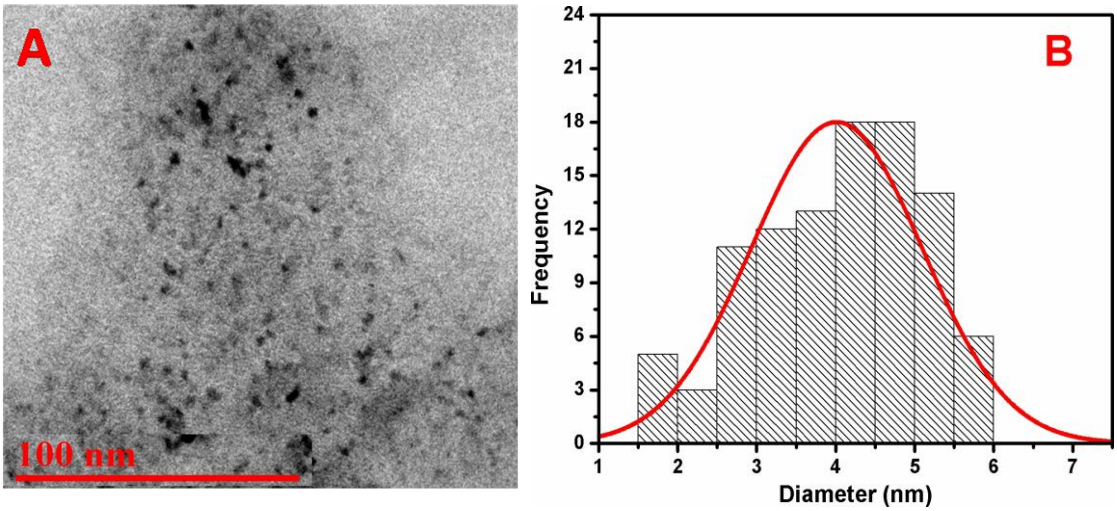

Figure S1: (a) TEM image of dialysed C_3N_4 QDs solution prepared by urea and trisodium citrate (b) size-distribution histogram (4.5±1.1 nm)

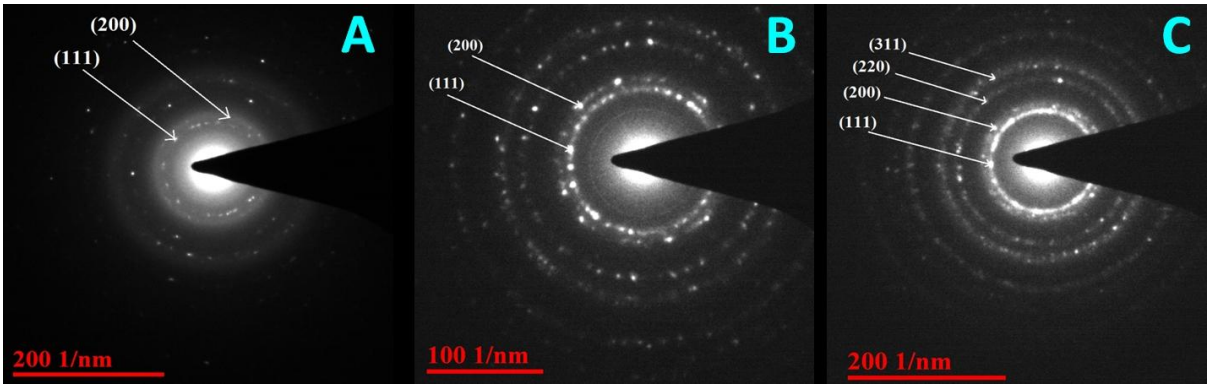

Figure S2: Selected area electron diffraction patterns in (a) Au, (b) Pd & (c) AuPd NPs.

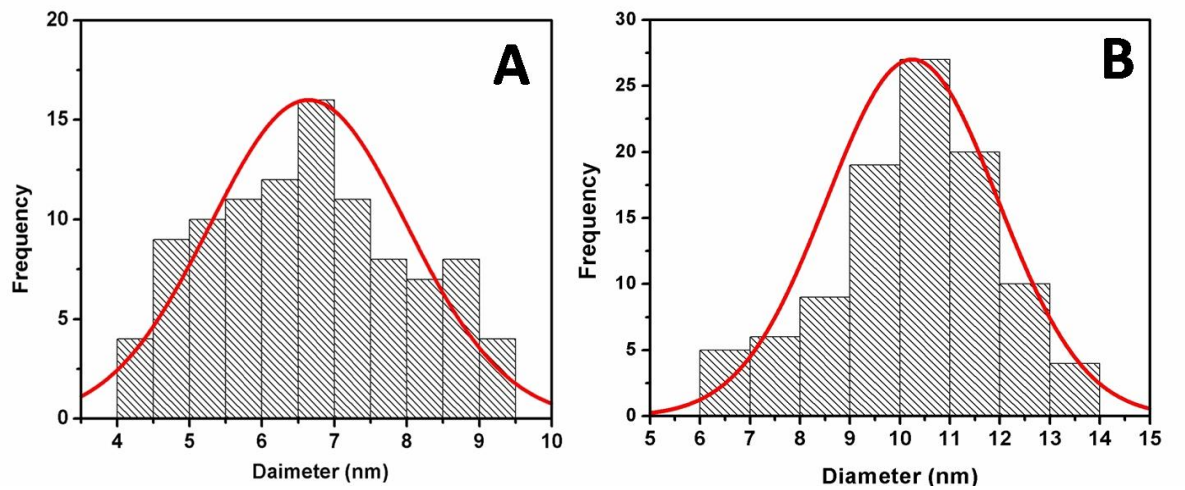

Figure S3: (a) Size-distribution histogram of Au NPs (6.8±1.3 nm) and (b) size-distribution histogram of Pd NPs (10.1±1.2 nm)

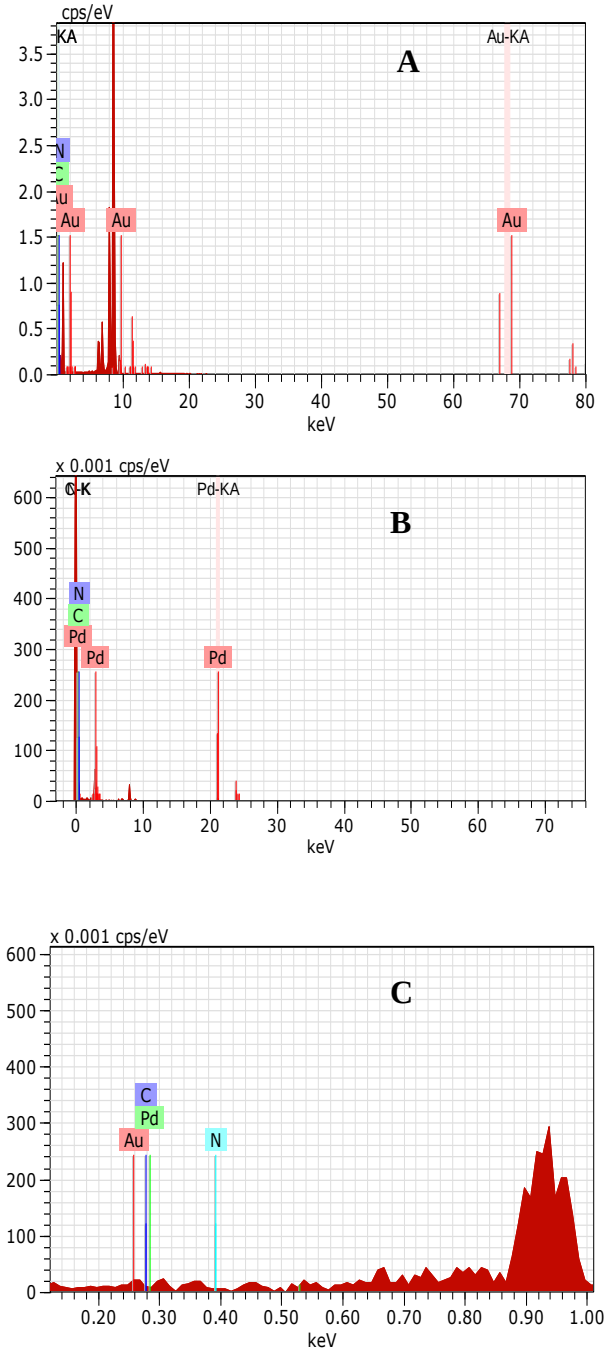

Figure S4: EDS spectra of (a) Au, (b) Pd & (c) AuPd NPs

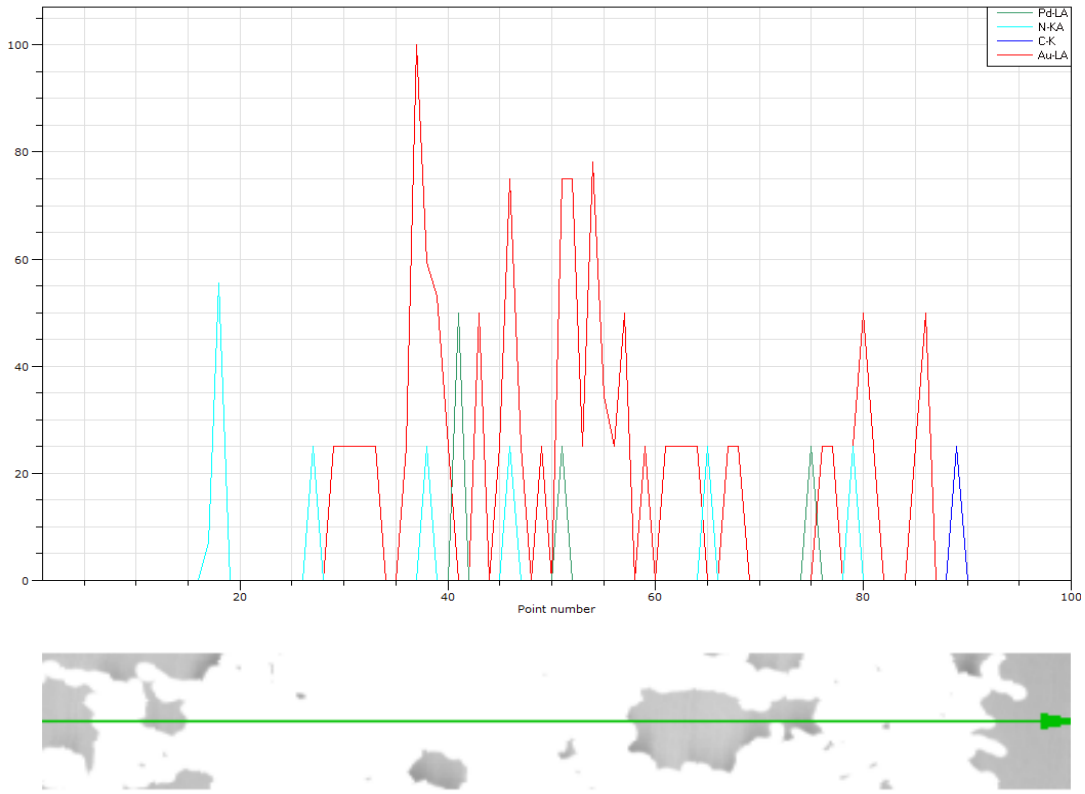

Figure S5: Line spectrum of AuPd NPs solution shows the presence of both Au and Pd nanoparticles with C and N from g-C_3N_4.

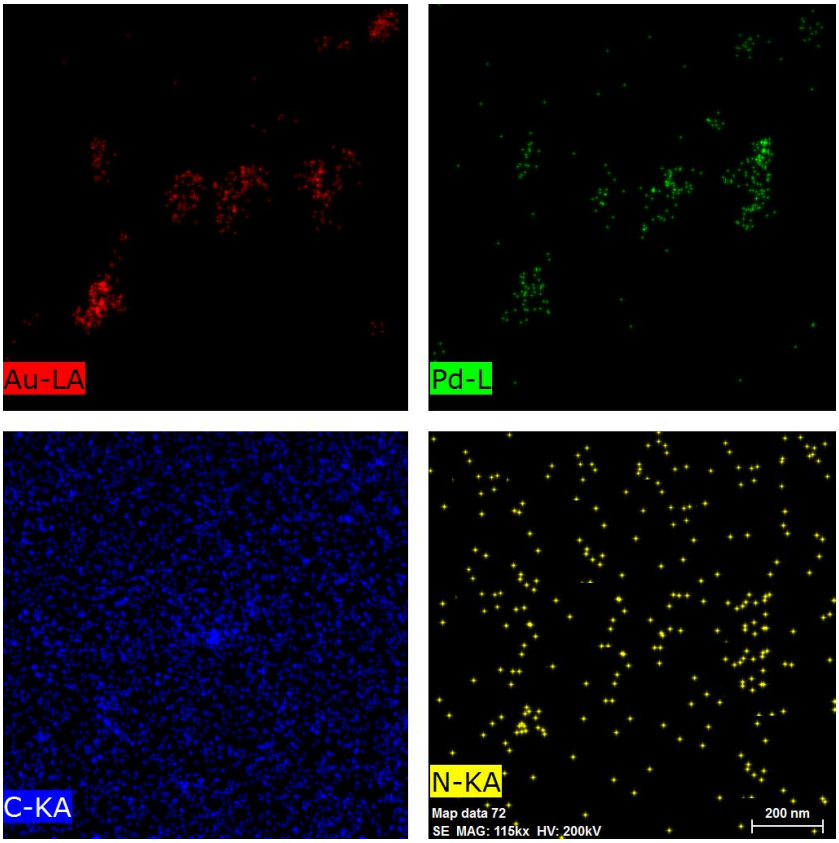

Figure S6: EDS mapping of AuPd alloy NPs shows the presence of both Au and Pd nanoparticles with C and N from C_3N_4.

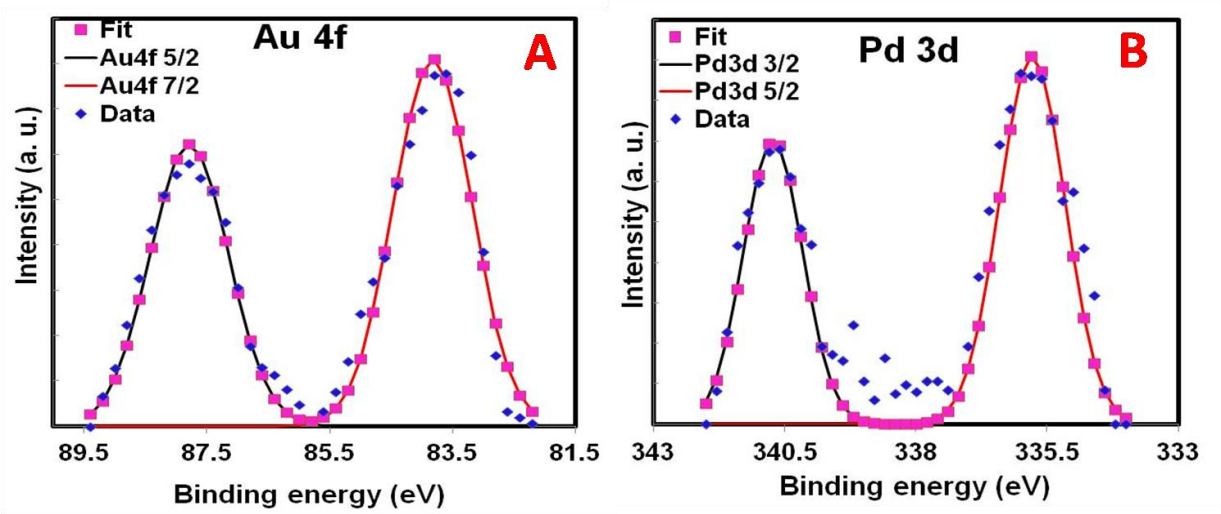

Figure S7: High resolution XPS spectra (a) Au 4f and (b) Pd 3d for Au and Pd NPs on g-C_3N_4 structure, respectively.

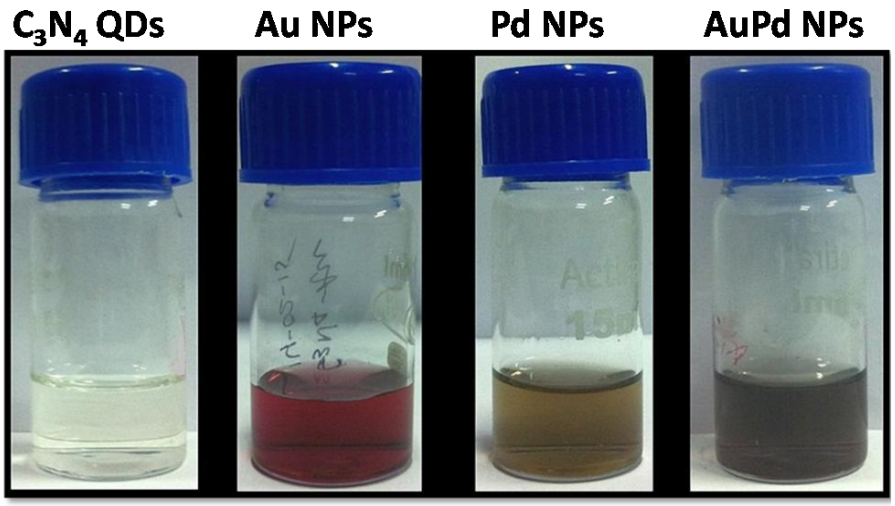

Figure S8: Digital photograph of C_3N_4 QDs, Au, Pd and AuPd NPs

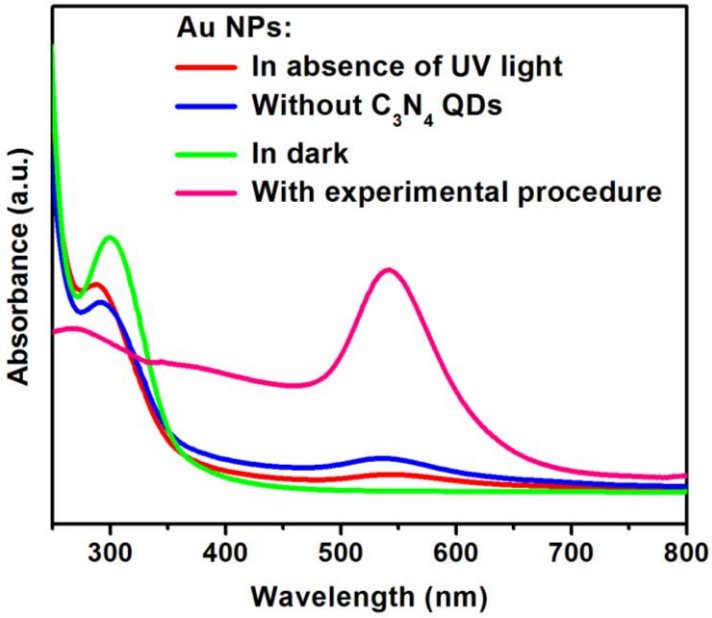

Figure S9: UV-vis of Au solution synthesized in different conditions (in absence of UV light, without C_3N_4 QDs, in dark, and with experimental procedure)

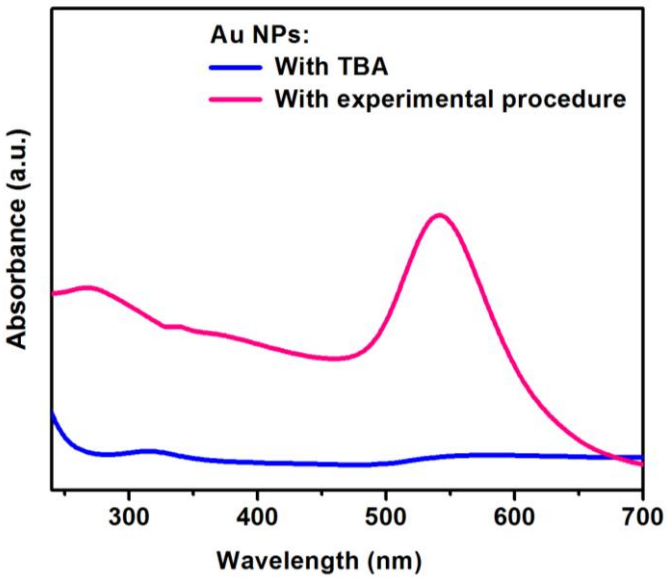

Figure S10: UV-vis of Au NPs solution synthesized in presence of an electron scavenger, Tert-butyl alcohol (TBA) and with experimental procedure (without electron scavenger).

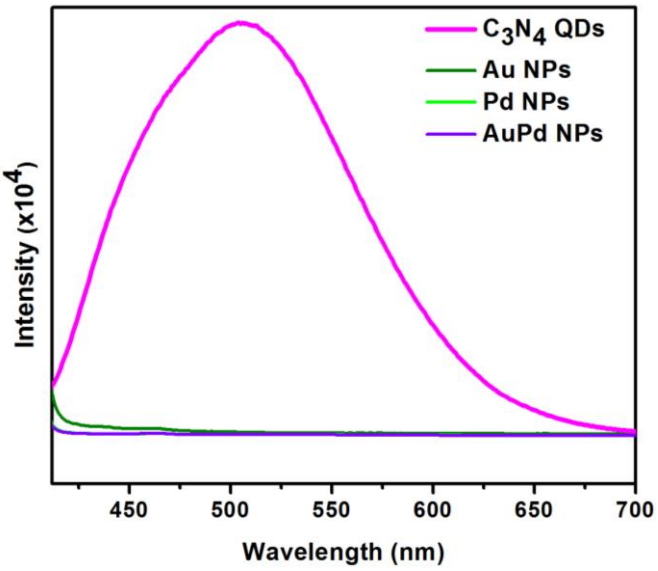

Figure S11: Comparative photoluminescence spectra of C_3N_4 QD and Au, Pd, and AuPd NPs.

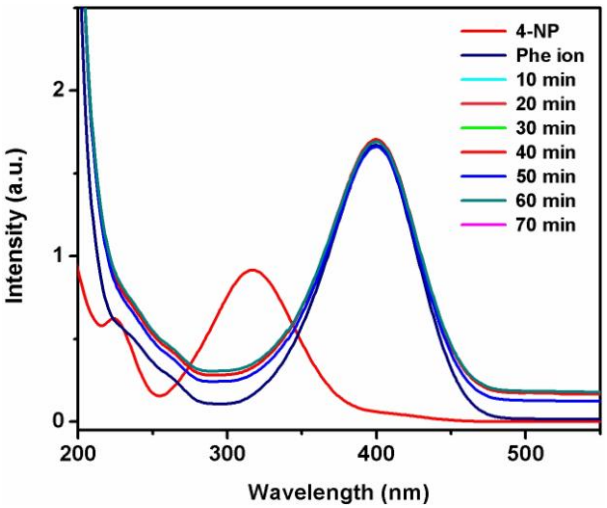

Figure S12. UV-vis spectra of 4-nitrophenol and 4-nitrophenolate ion after addition of $NaBH_4$ in the absence of any catalyst

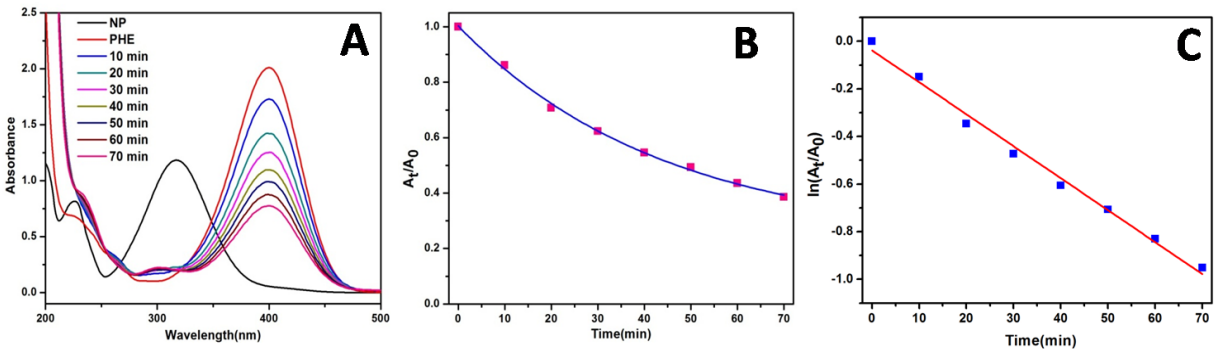

Figure S13. UV-vis spectra of (a) 4-nitrophenol reduction in presence of C_3N_4 (b) A_t/A_0 vs. time (min) plot (c) ln (A_t/A_0) vs. time (min) plot. Conditions: [4-NP] = 10^{-4} M and amount of catalyst = 30 µL.

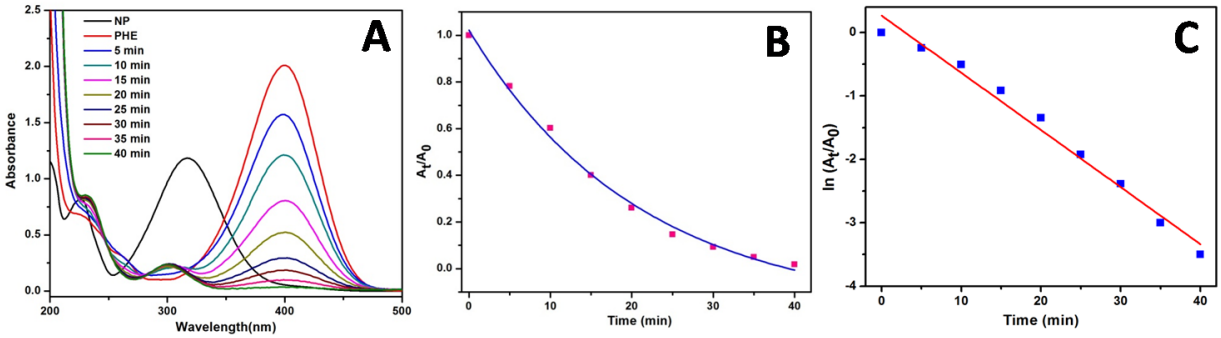

Figure S14. UV-vis spectra of (a) 4-nitrophenol reduction in presence of Au NPs (b) A_t/A_0 vs. time (min) plot (c) ln (A_t/A_0) vs. time (min) plot. Conditions: [4-NP] = 10^{-4} M and amount of catalyst = 30 µL.

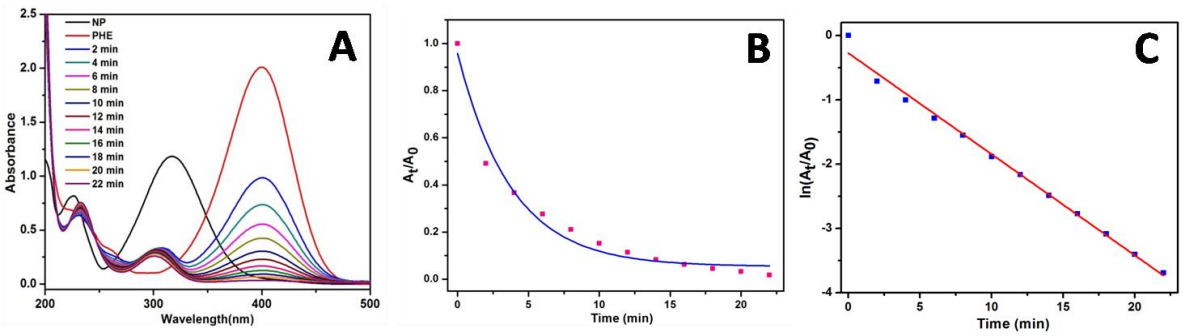

Figure S15. UV-vis spectra of (a) 4-nitrophenol reduction in presence of Pd NPs (b) A_t/A_0 vs. time (min) plot (c) ln (A_t/A_0) vs. time (min) plot. Conditions: [4-NP] = 10^{-4} M and amount of catalyst = 30 µL.

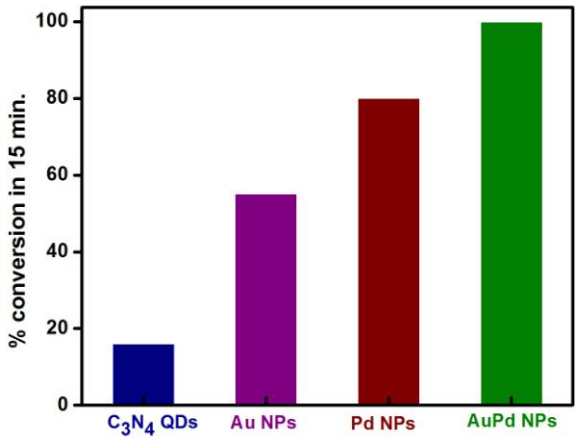

Figure S16. Comparative study of percent conversion from 4-NP to 4-AP in 15 min C_3N_4 QDs, Au, Pd & AuPd NPs

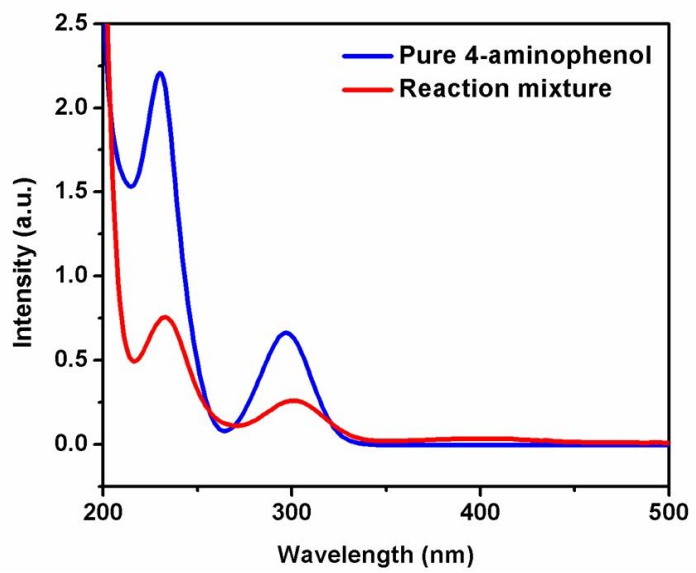

Figure S17. UV-vis spectra of pure 4-aminophenol and reaction mixture

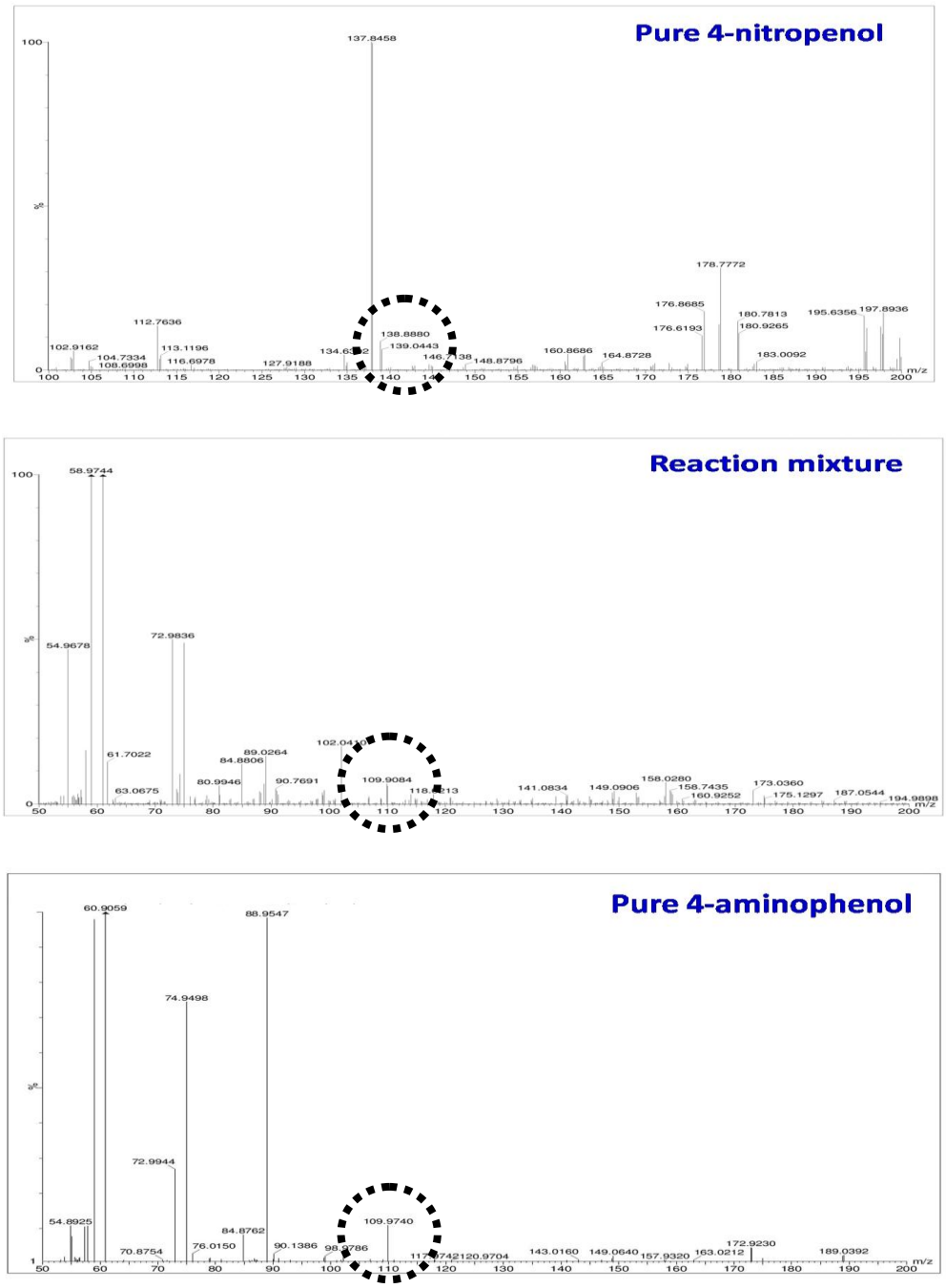

Figure S18. Mass spectra of pure 4-nitrophenol, reaction mixture and pure 4-aminophenol. The molecular ion peak for all is encircled.