Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Role of Dissolved Oxygen in Nitroarene Reduction Catalyzed by a Heterogeneous Silver Textile Catalyst in Water

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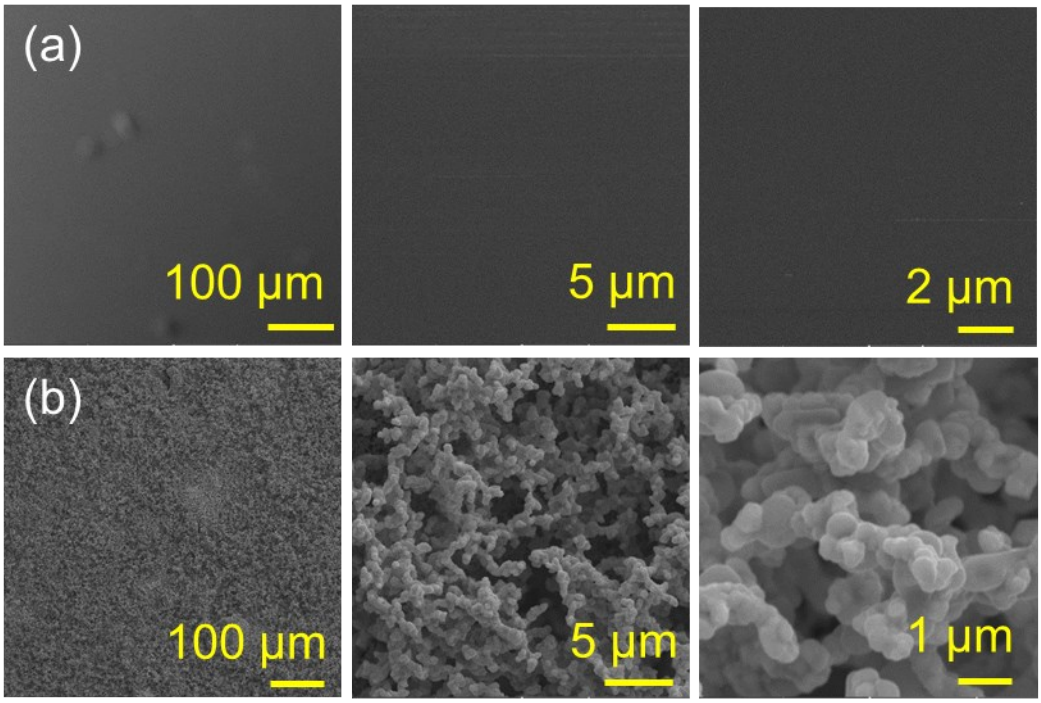

Figure S1. The SEM images at different magnification of (a) OHP sheet and (b) silver coated OHP sheet.

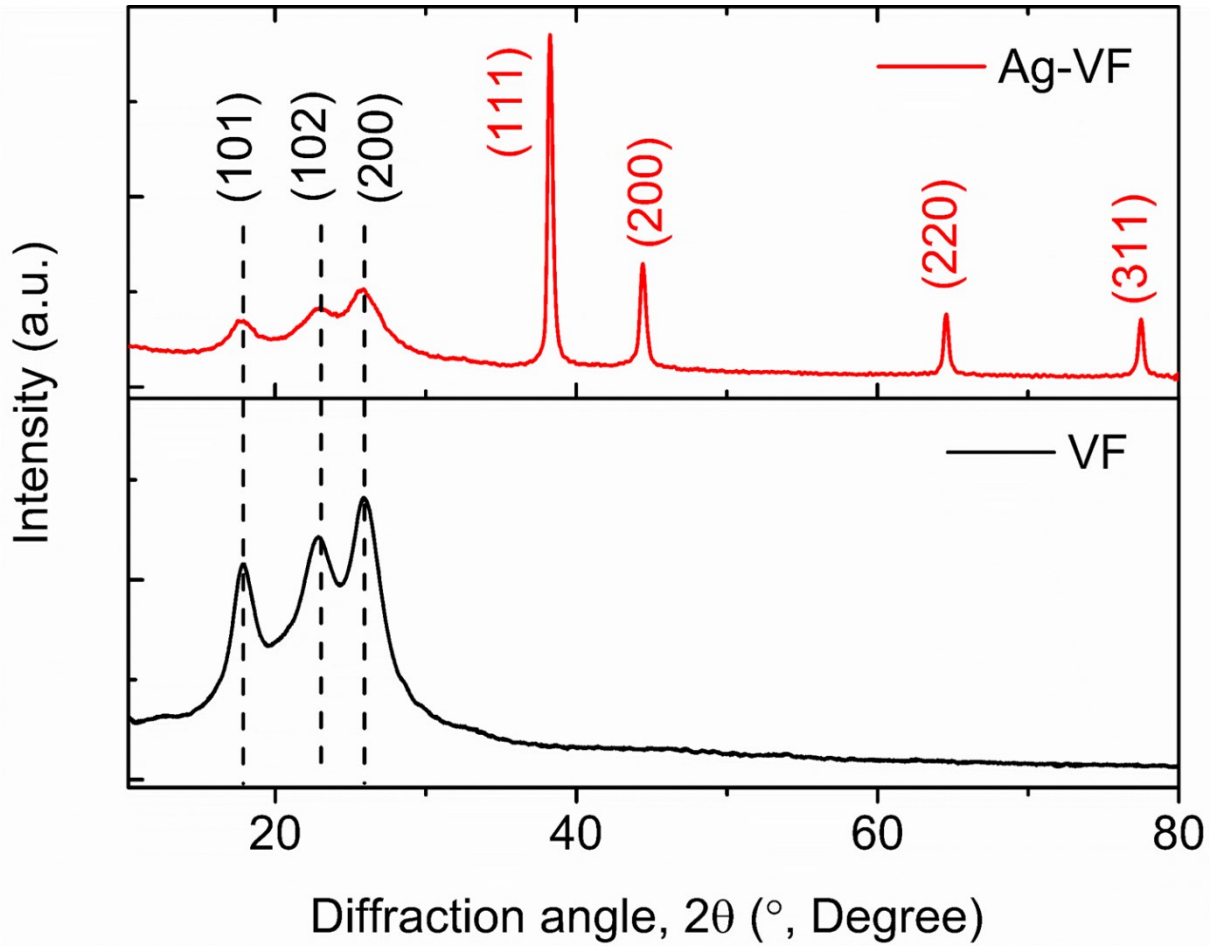

Figure S2. X-ray Diffraction pattern of VF and Ag-VF.

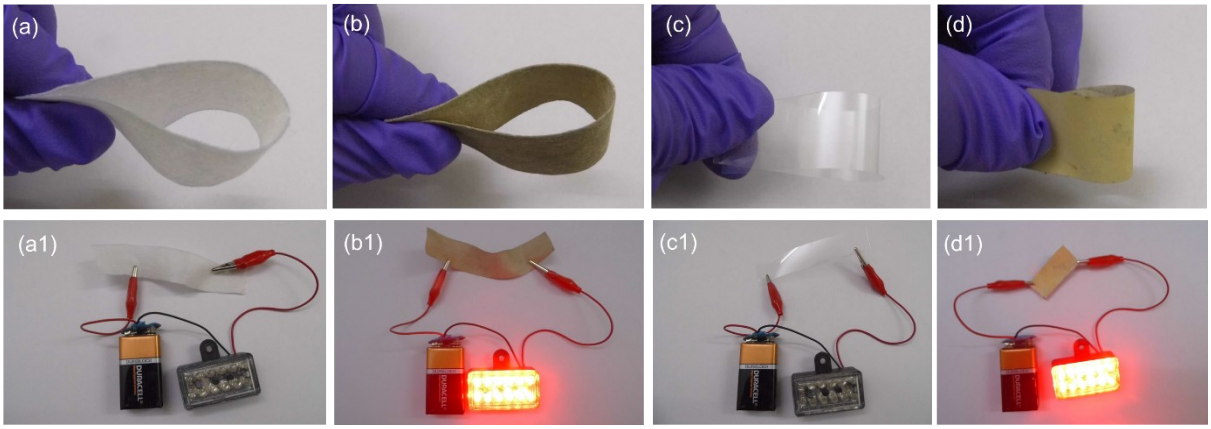

Figure S3. The illustration of conductivity nature of (a, a1) bare-VF, (b, b1) Ag-VF, (c, c1) bare-OHP and (d, d1) Ag-OHP.

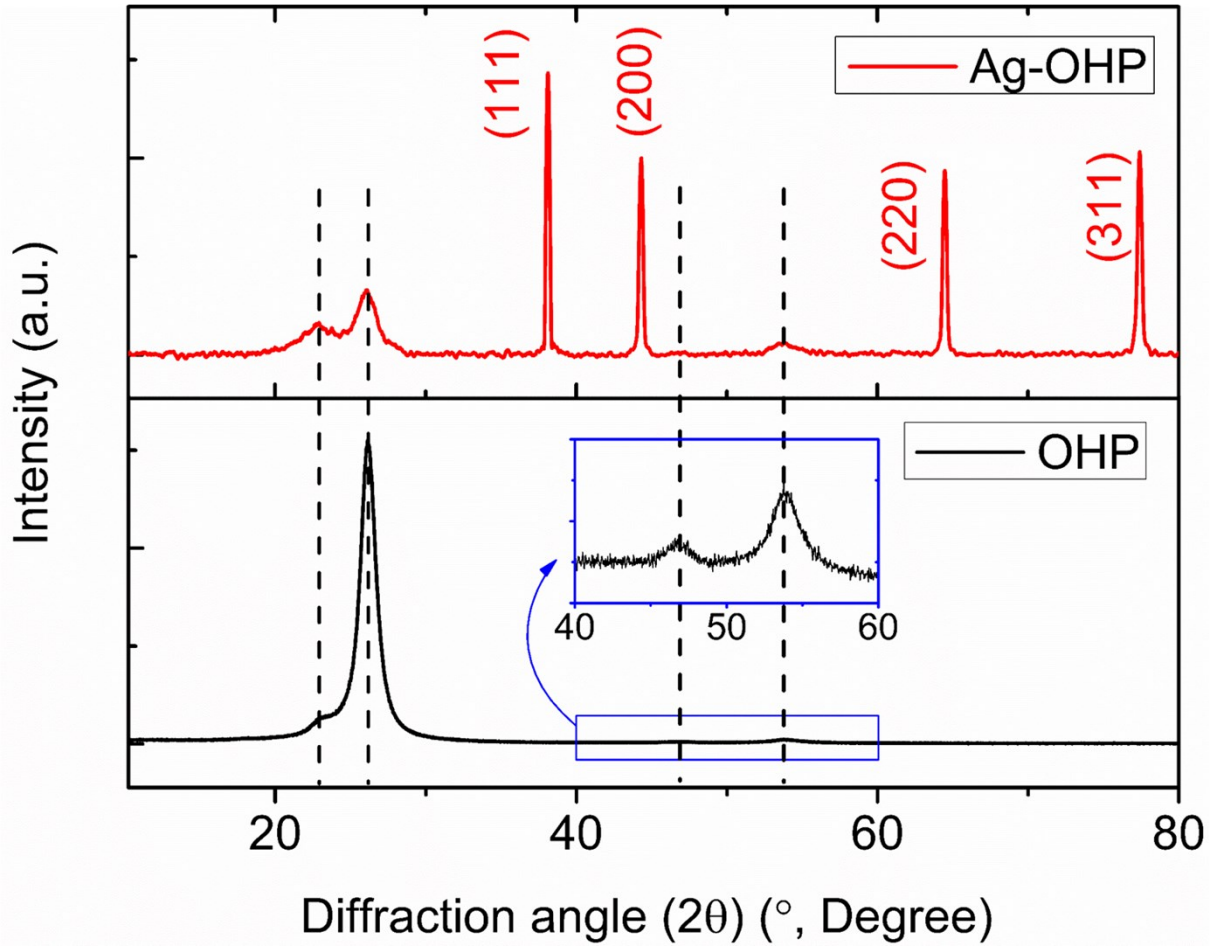

Figure S4. X-ray Diffraction pattern of OHP sheet and silver coated OHP (Ag-OHP) sheet.

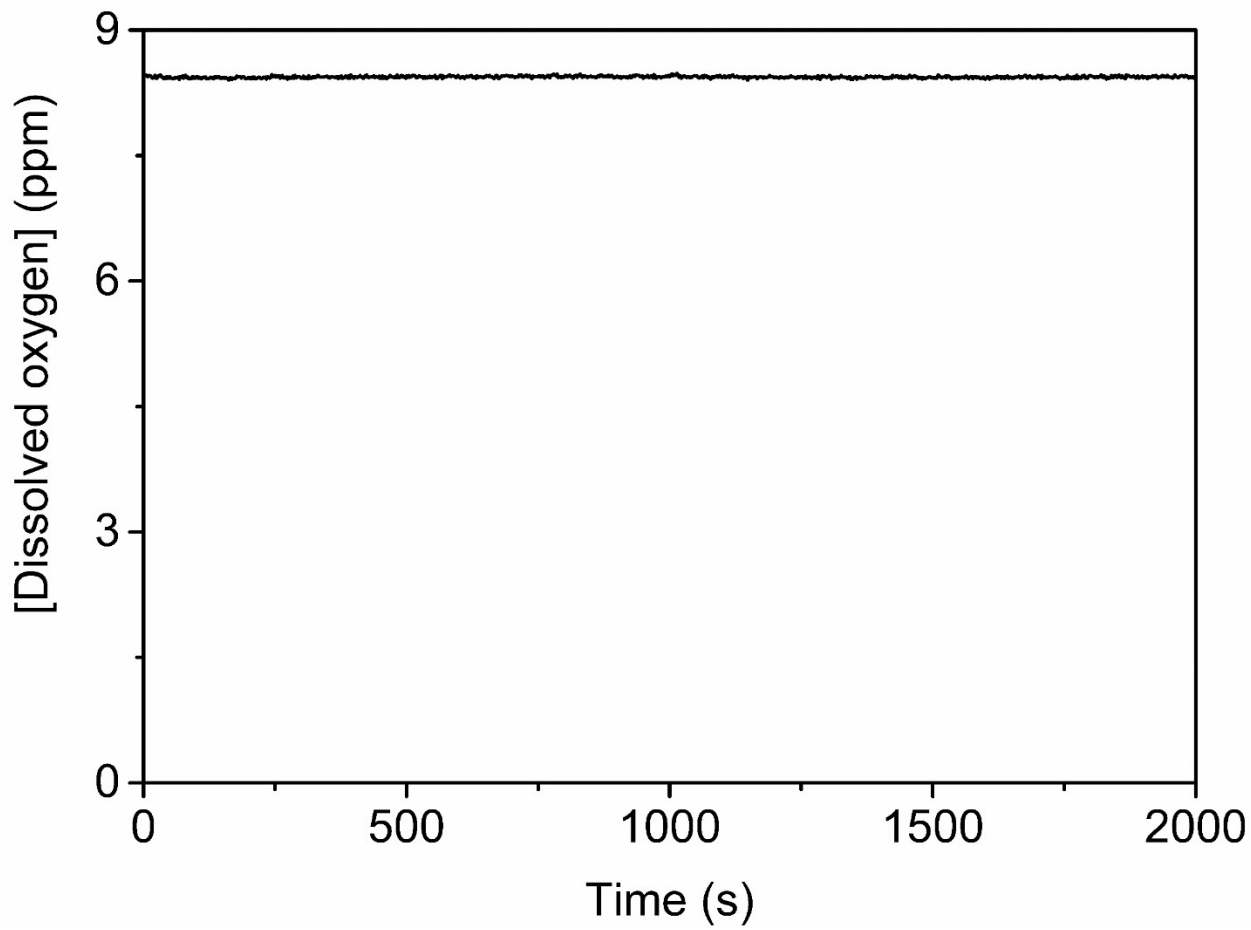

Figure S5. The dissolved oxygen variation in water with respect to time.

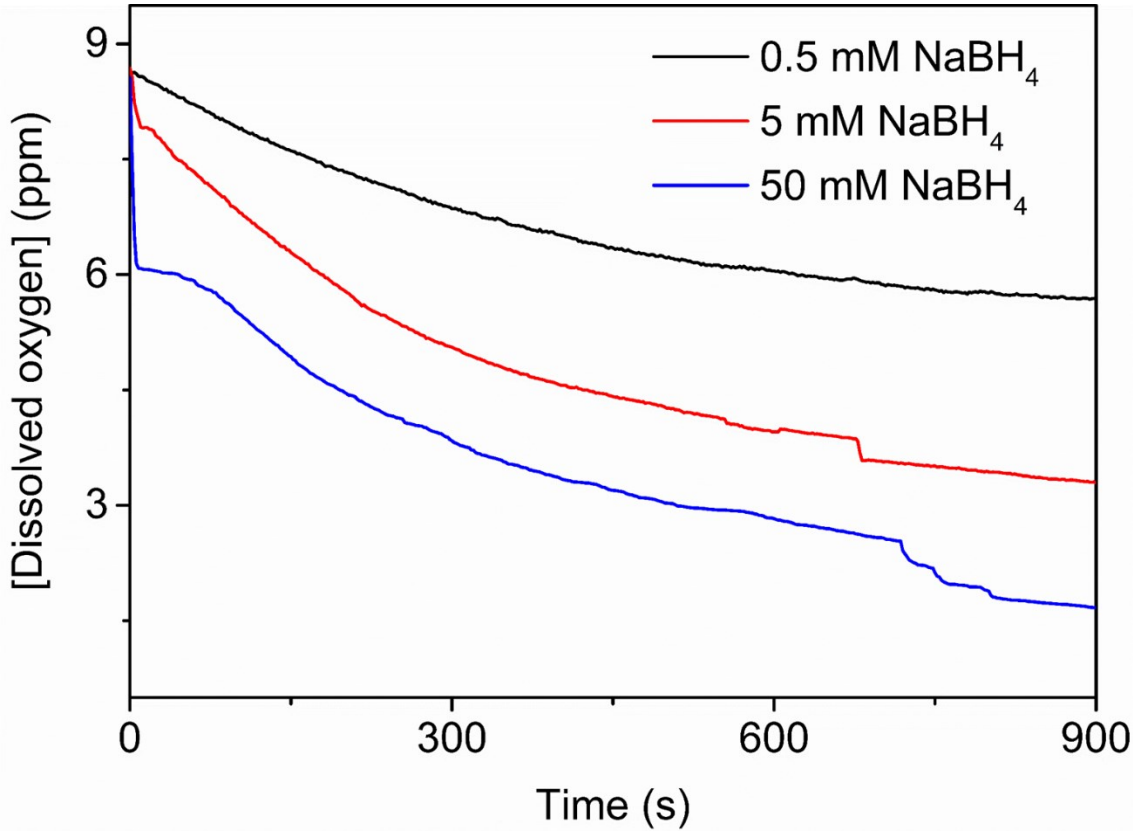

Figure S6. The time dependent variation of dissolved oxygen in water upon the addition of $NaBH_4$ (Stirring speed: 500 rpm, Temperature: 27 ± 1 °C).

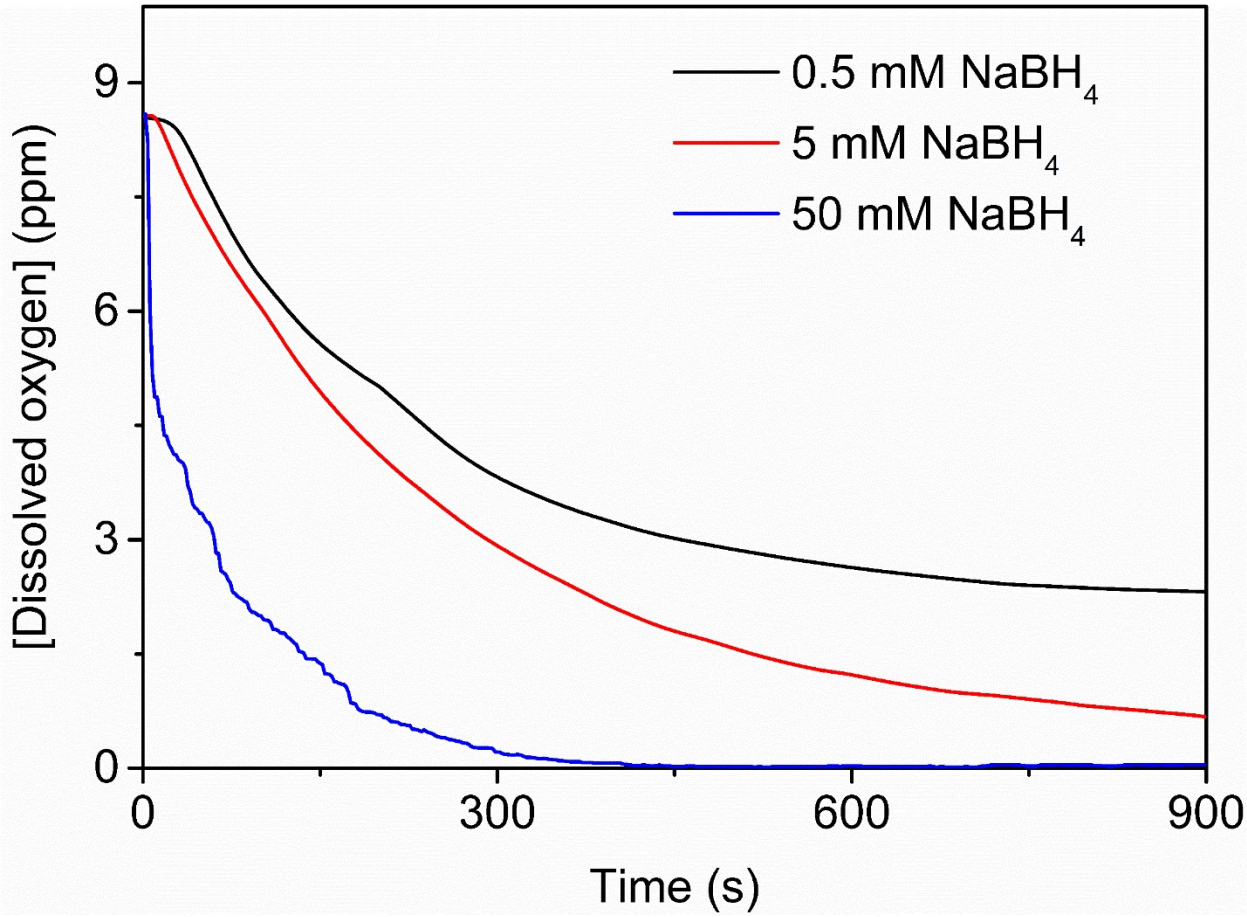

Figure S7. The time dependent variation of dissolved oxygen in water upon the addition of 50 µM 4-nitrophenol and $NaBH_4$ (Stirring speed: 500 rpm, Temperature: 27 ± 1 °C).

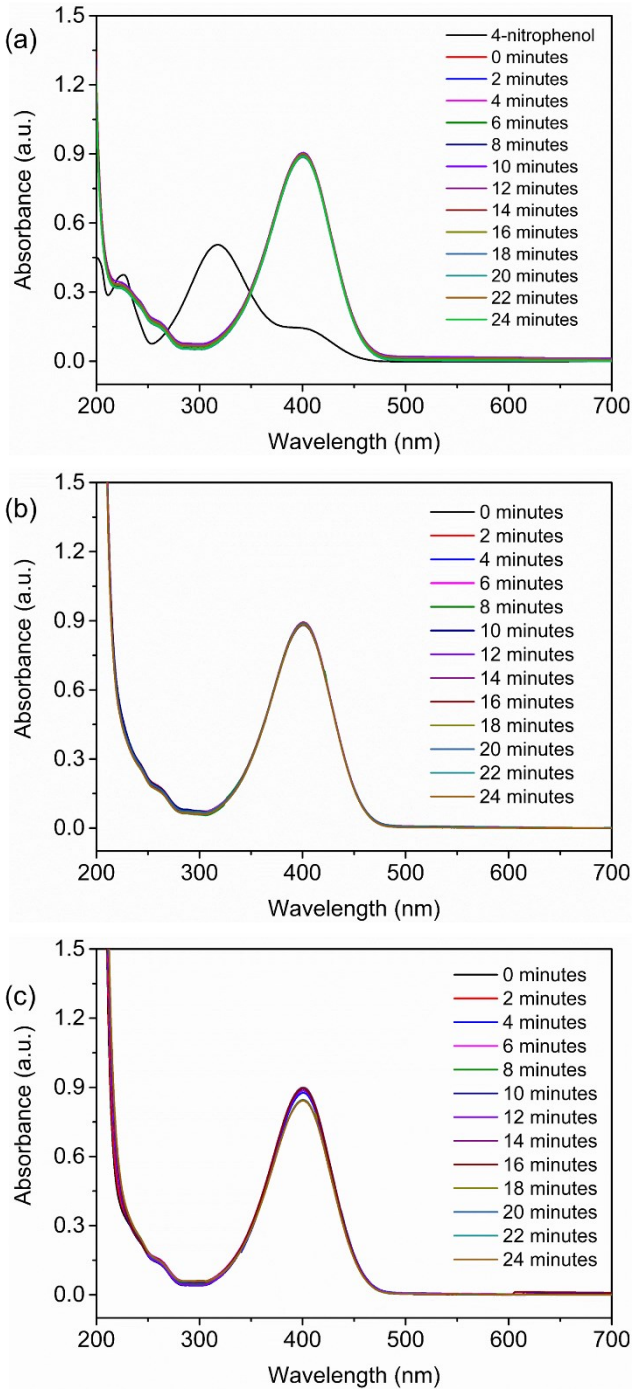

Figure S8. UV-Vis spectra of 50 µM 4-nitrophenol reduction upon the addition of a) 0.5 mM $NaBH_4$, b) 5 mM $NaBH_4$ and c) 50 mM $NaBH_4$ in water.

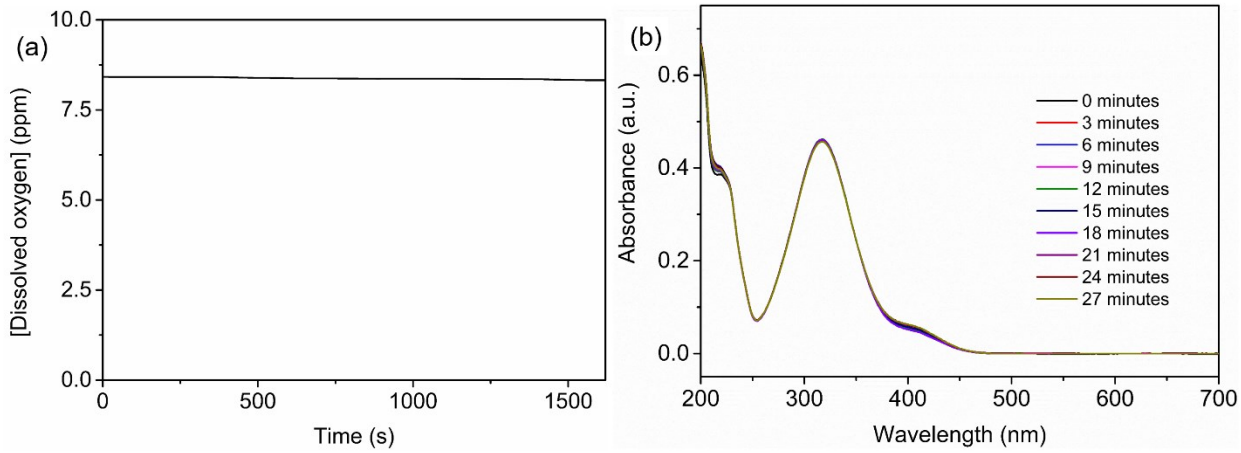

Figure S9. a) The dissolved oxygen concentration variation and b) UV-Vis spectra of reaction mixture containing 50 µM 4-nitrophenol and 4 cm^2 Ag-VF catalyst at 27 °C.

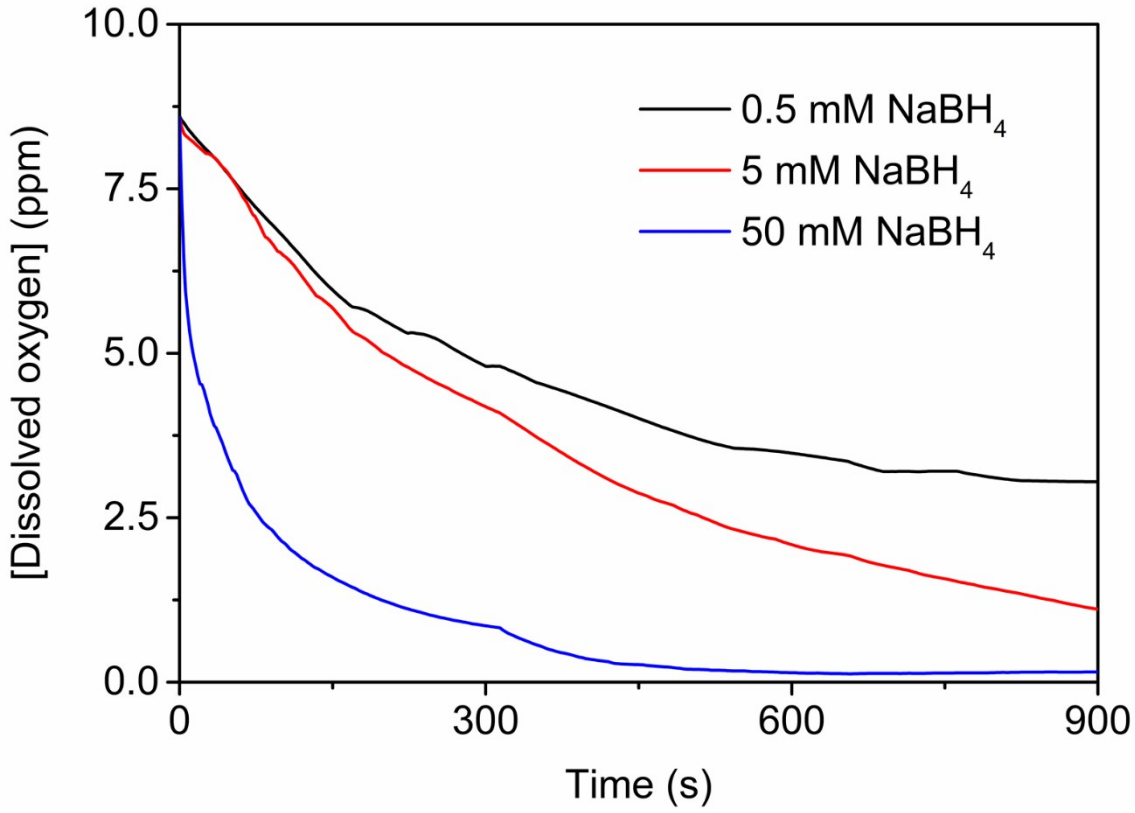

Figure S10. The time-dependent variation of dissolved oxygen in water upon the addition of 50 µM 4-nitrophenol and $NaBH_4$ in the presence of 1 cm^2 VF.

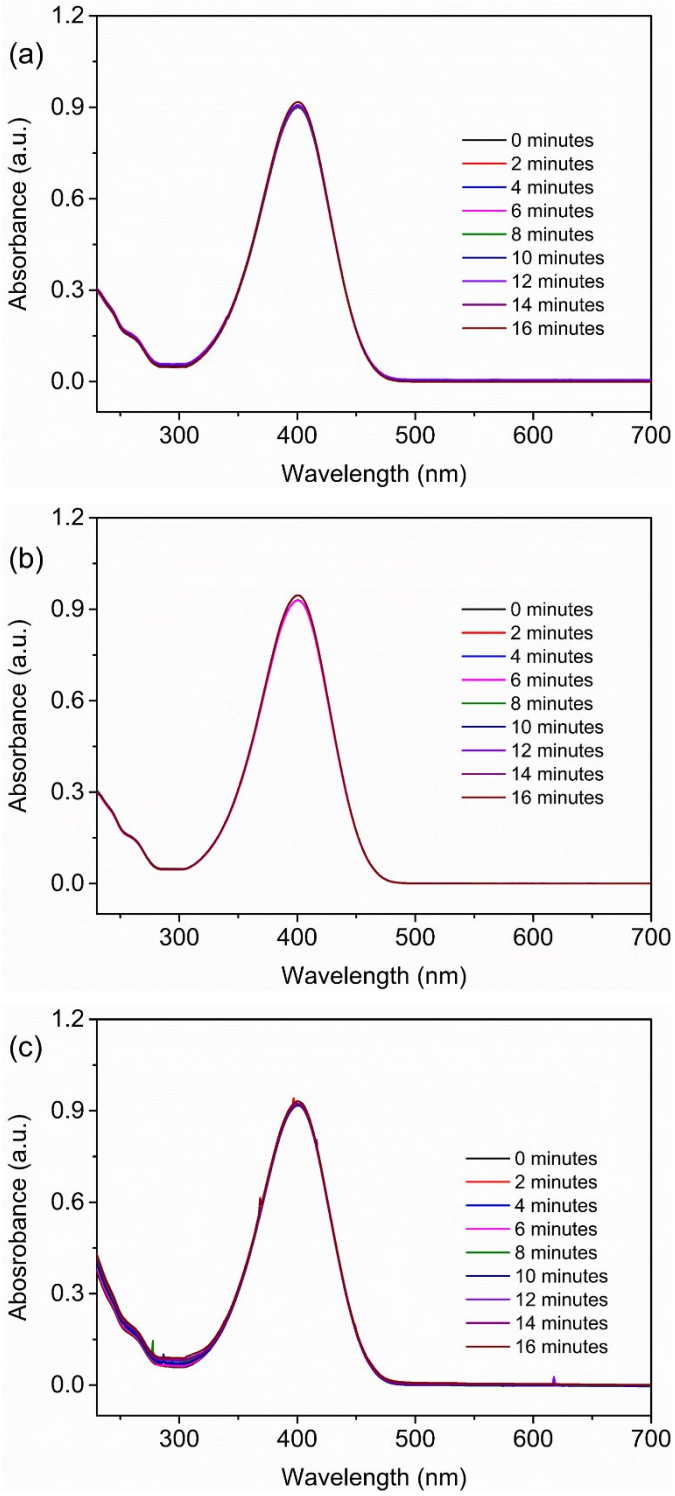

Figure S11. UV-Vis spectra of 50 µM 4-nitrophenol reduction upon the addition of a) 0.5 mM $NaBH_4$, b) 5 mM $NaBH_4$ and c) 50 mM $NaBH_4$ in the presence of 1 cm^2 VF.

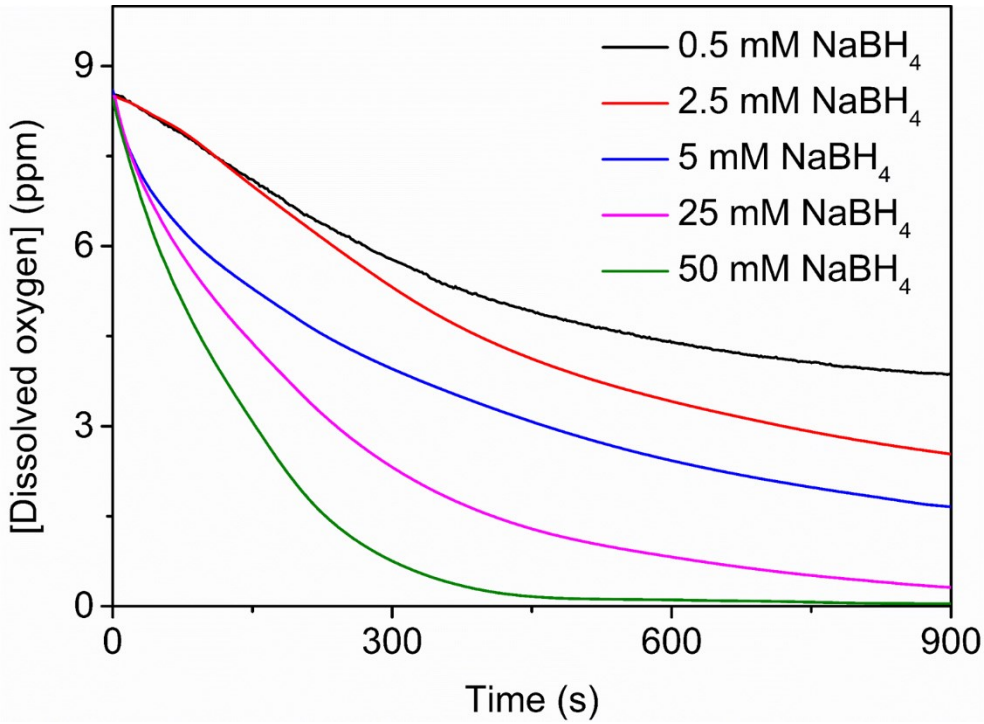

Figure S12. The time-dependent variation of dissolved oxygen in water upon the addition of $NaBH_4$ in the presence of 1 cm^2 Ag-VF.

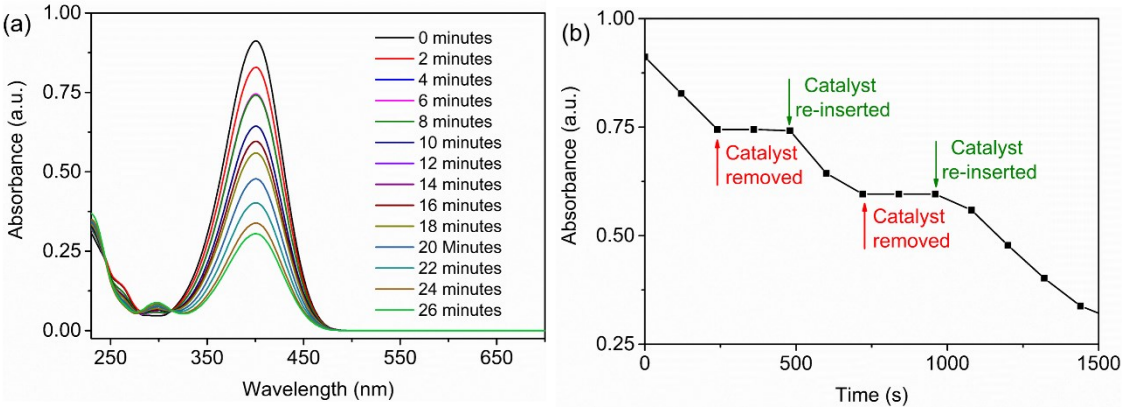

Figure S13. a) The UV-Vis spectra of 4-nitrophenol reduction in the presence/absence of 1 cm^2 Ag-VF catalyst. The dip-catalyst removed (at 4 and 12 minutes) and re-inserted (at 8 and 16 minutes) into the reaction mixture. b) The time-dependent variation of 4-nitrophenolate absorbance at 400 nm.

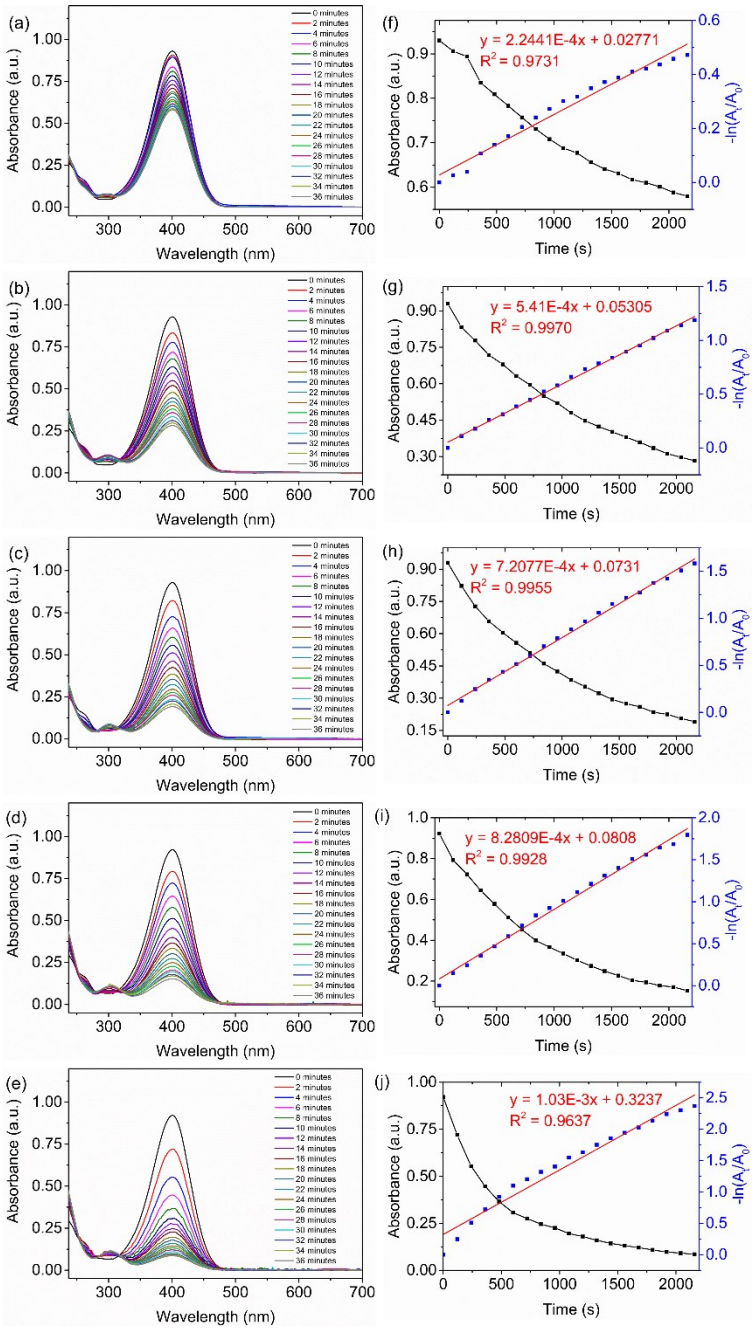

Figure S14. UV-Vis spectra of 50 µM 4-nitrophenol reduction upon the addition of (a) 0.5 mM $NaBH_4$, (b) 2.5 mM $NaBH_4$, (c) 5 mM $NaBH_4$, (d) 25 mM $NaBH_4$, and (e) 50 mM $NaBH_4$, in the presence of 1 cm^2 Ag-VF in water medium. (f-j) 4-nitrophenolate absorbance at 400 nm and $-\ln(A_t/A_0)$ versus time plot for the adjacent UV-Vis spectra.

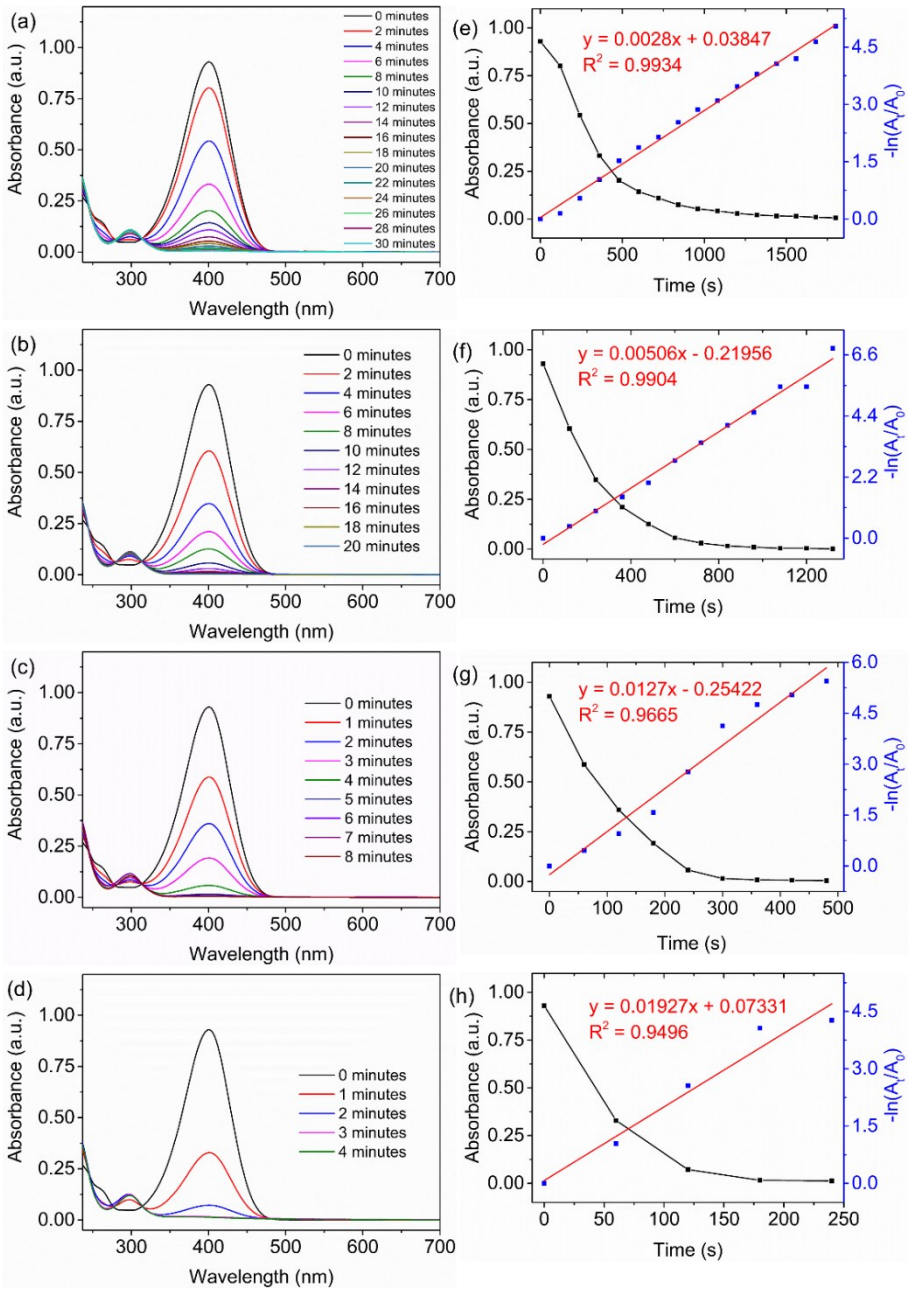

Figure S15. UV-Vis spectra of 50 µM 4-nitrophenol reduction upon the addition of 5 mM $NaBH_4$ sodium borohydride reagent in the presence of (a) 4 cm^2 Ag-VF, (b) 9 cm^2 Ag-VF, (c) 16 cm^2 Ag-VF and (d) 25 cm^2 Ag-VF in water medium. (e-h) The 4-nitrophenolate absorbance at 400 nm and $-\ln(A_t/A_0)$ versus time plot for the adjacent UV-Vis spectra.

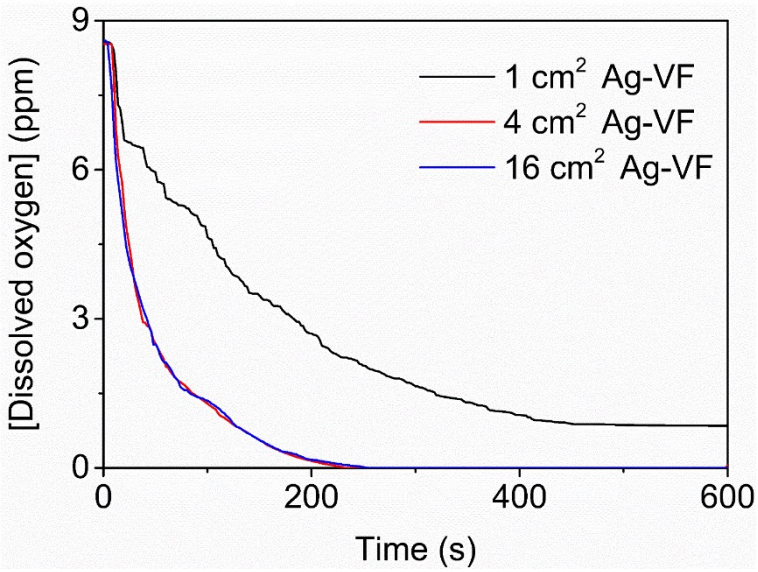

Figure S16. The *in situ* measurement of dissolved oxygen in water upon the addition of 5 mM $NaBH_4$ in the presence of Ag-VF.

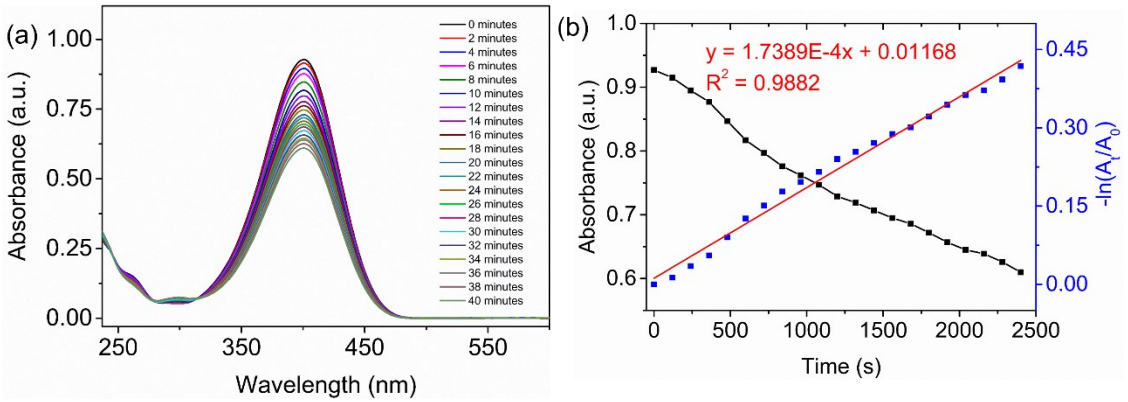

Figure S17. UV-Vis spectra of 50 µM 4-nitrophenol reduction upon the addition of 5 mM $NaBH_4$ sodium borohydride reagent in the presence of (a) 4 cm^2 Ag-OHP in water and (b) the 4-nitrophenolate absorbance at 400 nm and $-\ln(A_t/A_0)$ versus time plot for the adjacent UV-Vis spectra.

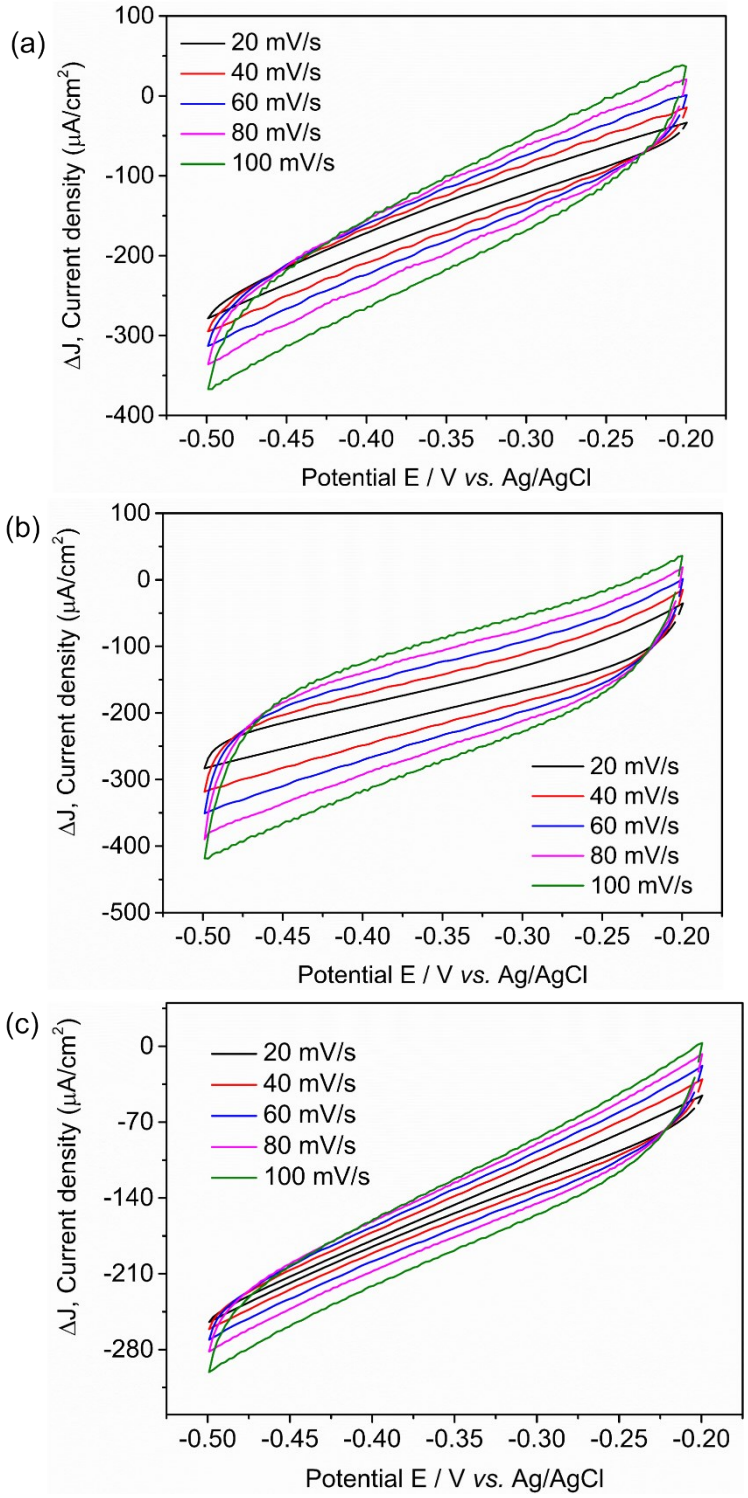

Figure S18. The cyclic voltammogram of (a) Ag-OHP, (b) Ag-VF and c) Ag-Foil electrode at various scan rates in 1 M Na_2SO_4 solution.

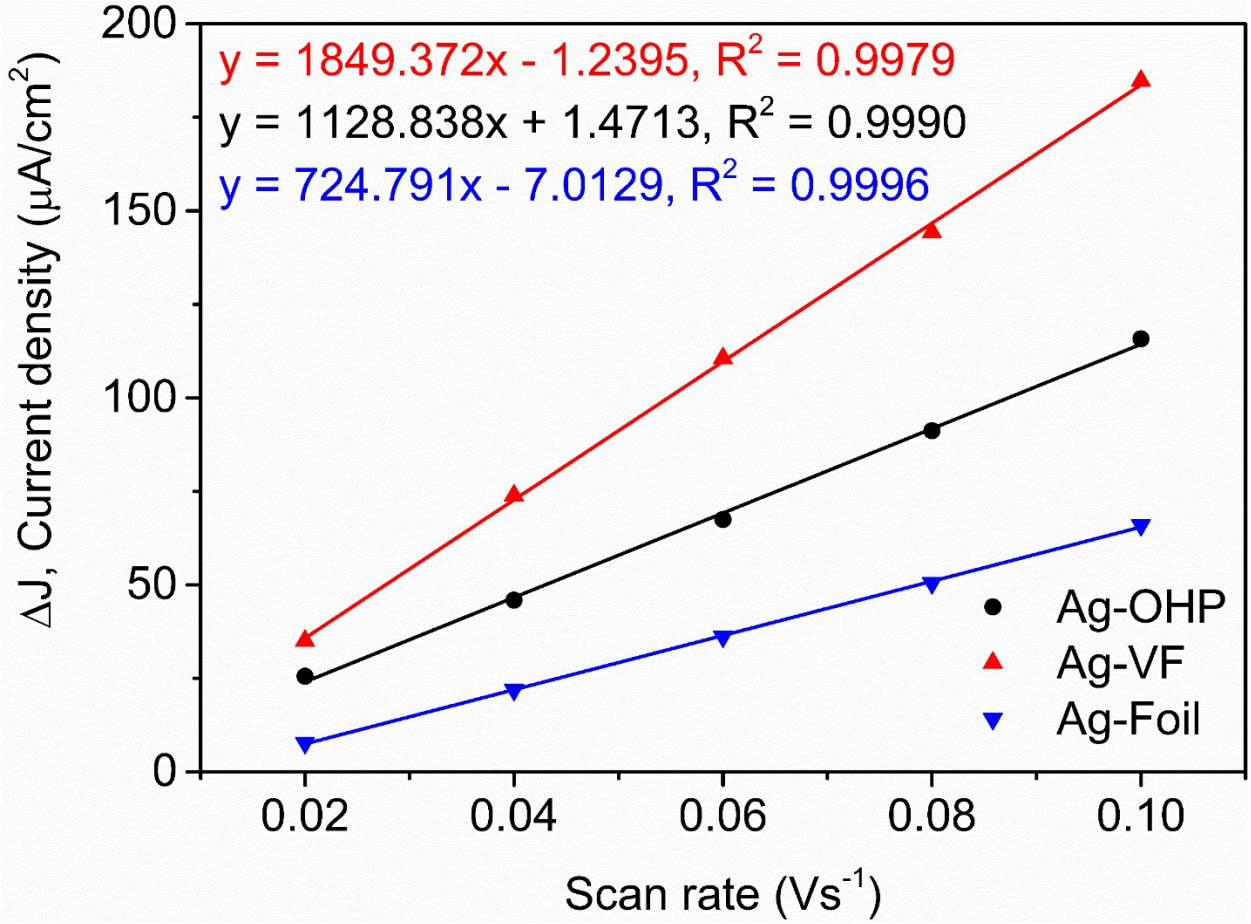

Figure S19. The plot of change in current density versus scan rate.

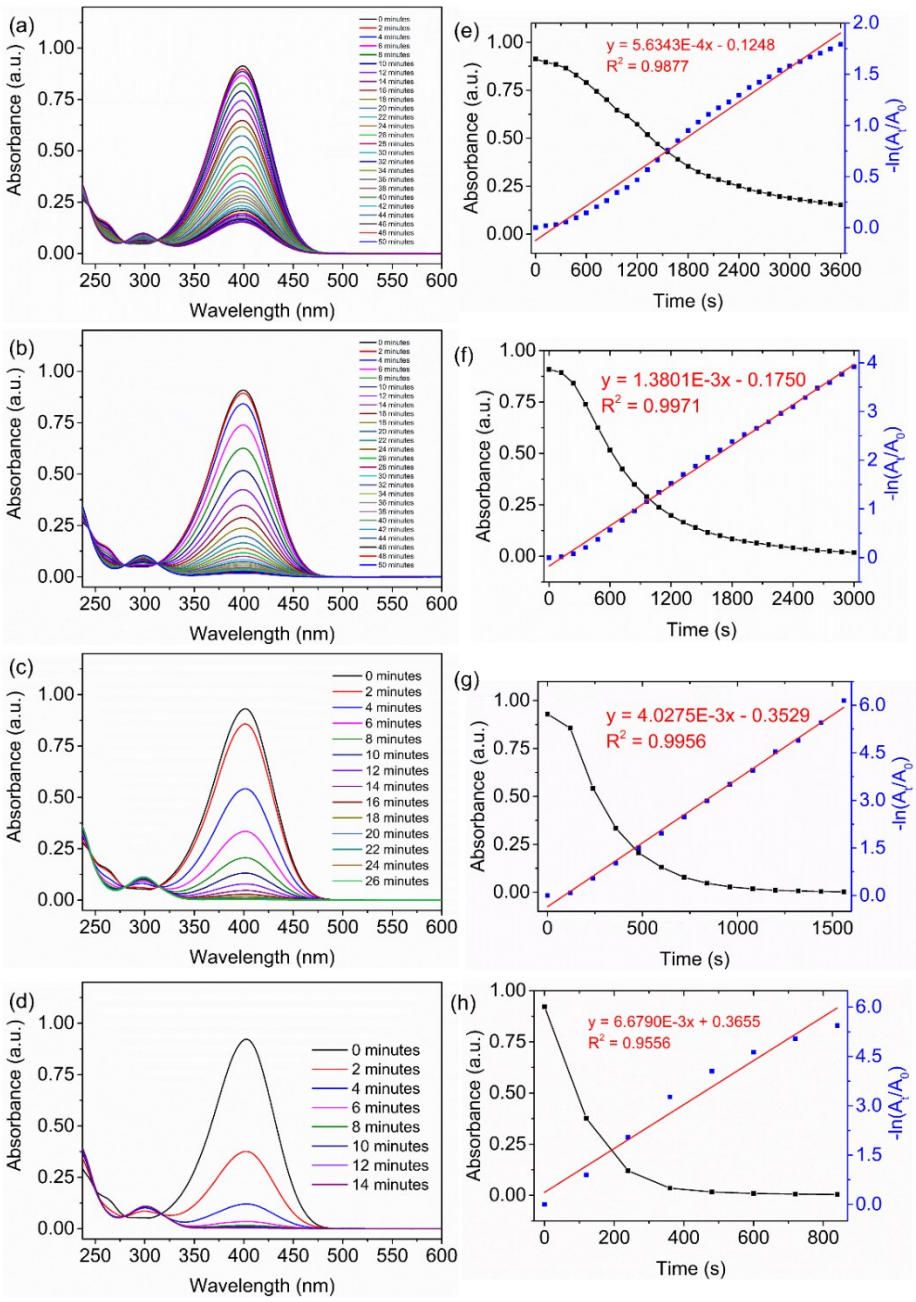

Figure S20. The UV-Vis spectra of 50 µM 4-nitrophenol reduction upon the addition of 5 mM $NaBH_4$ reagent in the presence of 4 cm^2 Ag-VF at the temperature of (a) 280 K, (b) 290 K, (c) 310 K and (d) 320 K in the water medium. (e-h) 4-nitrophenol absorbance at 400 nm and $-\ln(A_t/A_0)$ versus time plot for the adjacent UV-Vis spectra.

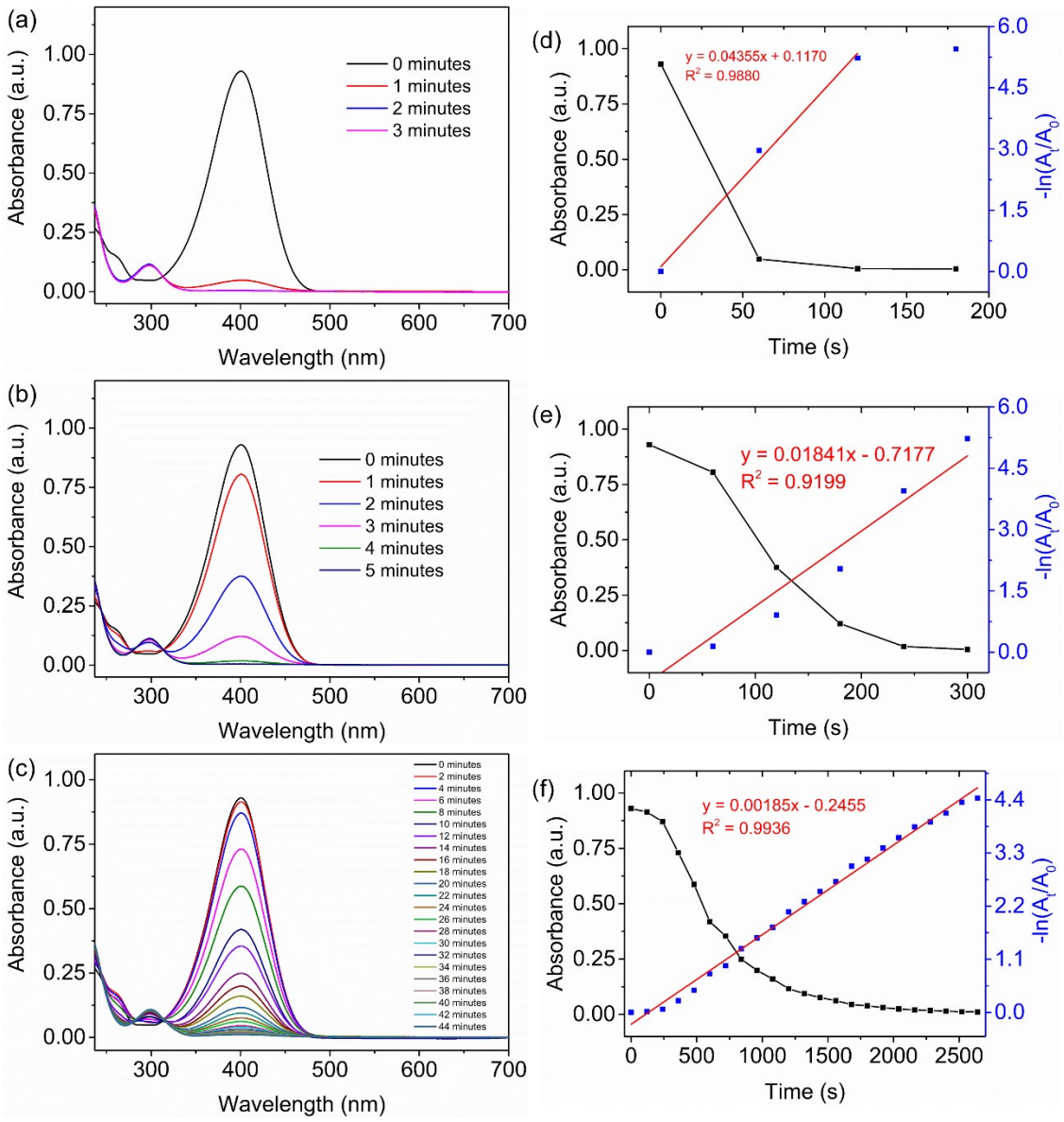

Figure S21. The UV-Vis spectra of 4 cm^2 Ag-VF catalyzed reduction of 50 µM 4-nitrophenol reduction upon the addition of 5 mM $NaBH_4$ reagent in the presence of dissolved oxygen concentration of (a) 0.45 ppm, (b) 4.02 ppm, and (c) 12.21 ppm. (d-f) 4-nitrophenol absorbance at 400 nm and $-\ln(A_t/A_0)$ versus time plot for the adjacent UV-Vis spectra.

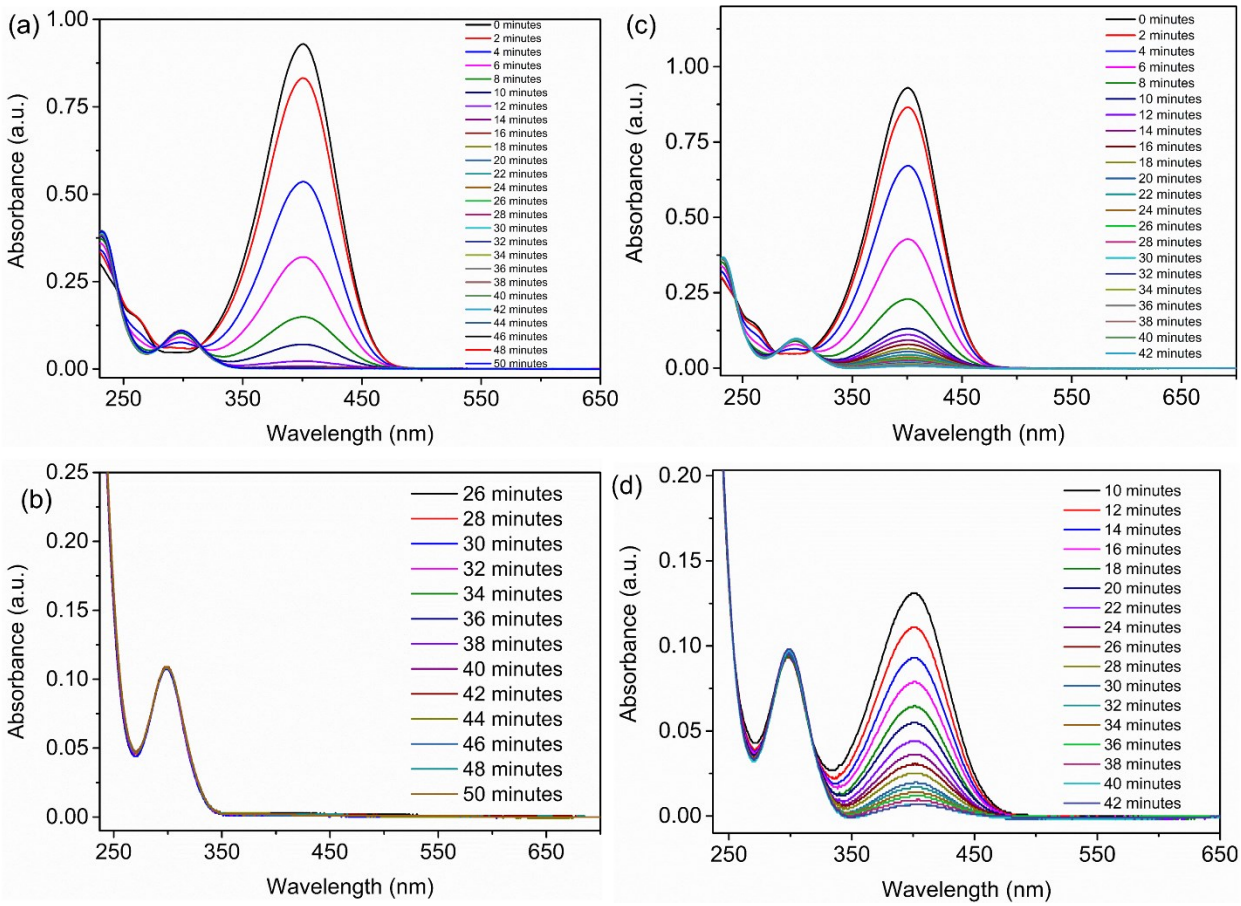

Figure S22. UV-Vis spectra of 4-nitrophenol reduction of the reaction mixture (a, b) purging oxygen at the end of the reaction and (c, d) purging oxygen during the reaction. The UV-Vis spectra of the reaction mixture (a,c) before and after purging of oxygen, and (b,d) after purging of oxygen.

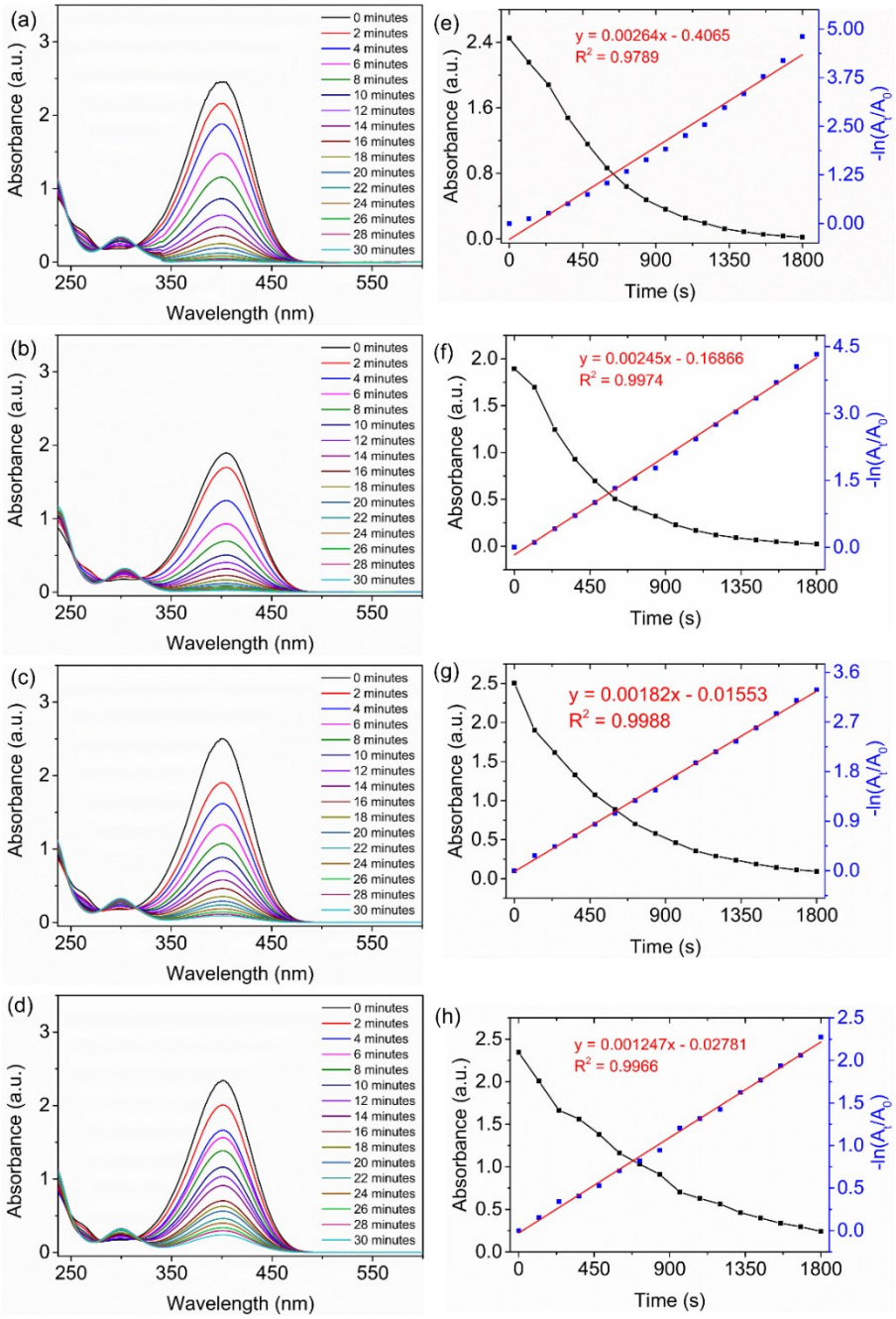

Figure S23. UV-Vis spectra of 4 cm^2 Ag-VF catalyzed reduction of 4-nitrophenol reduction upon the addition of 100 equivalent of $NaBH_4$ with respect to 4-NP having (a) 285 µM, (b) 1.27 mM, c) 2.84 mM, and (d) 6.37 mM in the presence of 8.6 ppm dissolved oxygen containing water. (e-h) The 4-nitrophenolate absorbance at 400 nm and -$ln(A_t/A_0)$ versus time plot for the adjacent UV-Vis spectra.

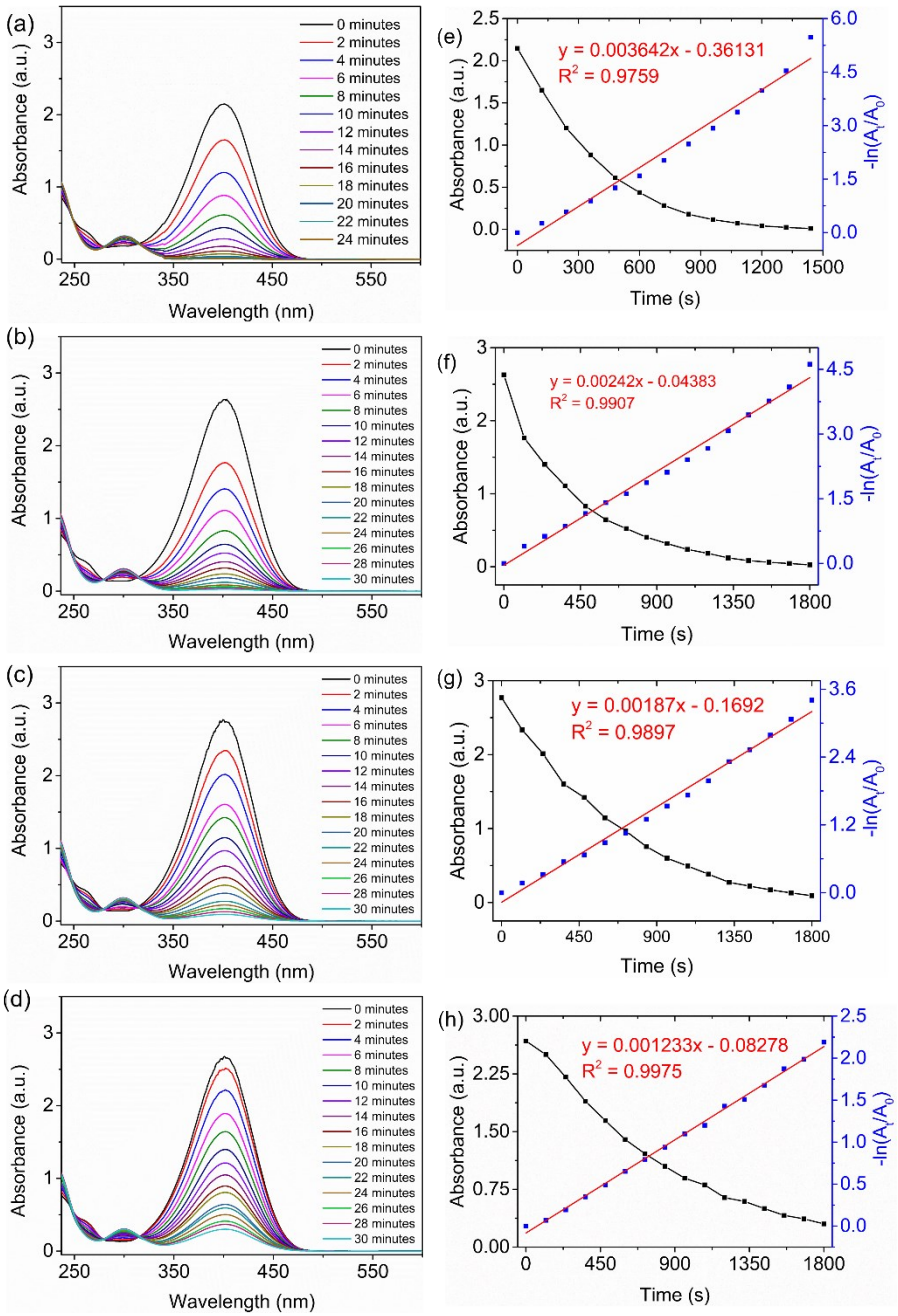

Figure S24. UV-Vis spectra of 4 cm^2 Ag-VF catalyzed reduction of 4-nitrophenol reduction upon the addition of 100 equivalent of $NaBH_4$ with respect to 4-NP having (a) 285 µM, (b) 1.27 mM, c) 2.84 mM, and (d) 6.37 mM in the presence of <0.8 ppm dissolved oxygen containing water. (e-h) 4-nitrophenolate absorbance at 400 nm and -$ln(A_t/A_0)$ versus time plot for the adjacent UV-Vis spectra.

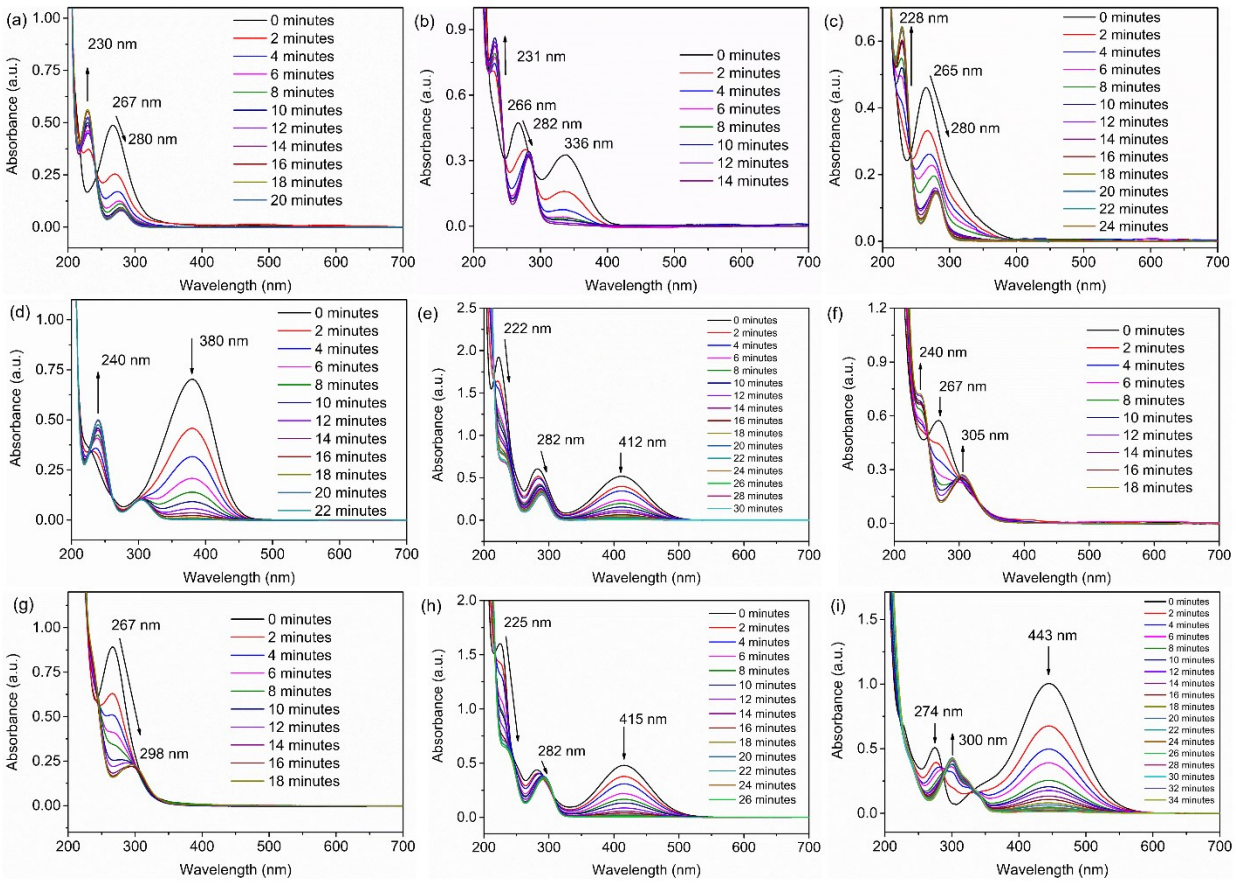

Figure S25. The UV-Vis spectra of 1 cm^2 Ag-VF catalyzed the reduction of 3 mmol nitroaromatics upon the addition of 100 equivalent of $NaBH_4$ in 10 ml of water at room temperature. The nitroarenes are (a) nitrobenzene, (b) 2-nitroanisole, c) 2-nitrotoluene, (d) 4-nitroaniline, (e) 2-nitroaniline, (f) 2-nitrobenzoic acid, (g) 3-nitrobenzoic acid, (h) 2-nitrophenol, and (i) 2-amino-4-nitrophenol.