# Supporting Information for:

Galvanic Replacement Approach for Bifunctional Polyacrylonitrile/Ag-M (M=Au or Pd) Nanofibers as SERS-active Substrates for Monitoring Catalytic Reaction

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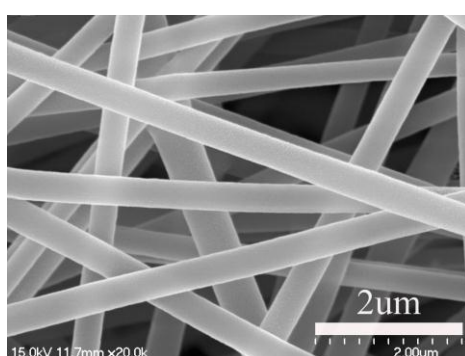
**Fig. S1** SEM image of electrospun PAN/AgNO$_3$ nanofibers
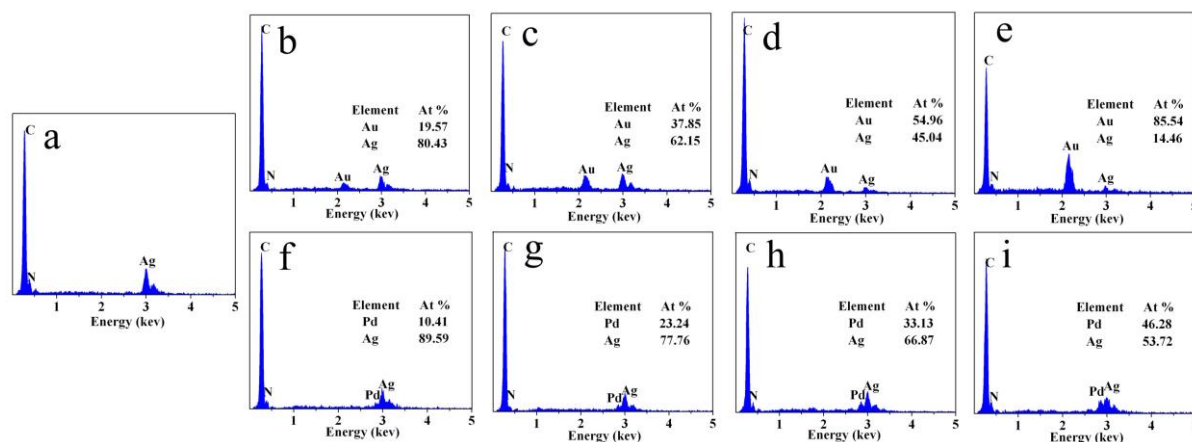
Fig. S2 SEM-EDS spectra of PAN/Ag nanofibers (a) PAN/Ag-M(M=Au or Pd) bimetallic nanofibers (b-i) with different composition: (b) PAN/Ag$_{0.8}$Au$_{0.2}$; (c) PAN/Ag$_{0.6}$Au$_{0.4}$; (d) PAN/Ag$_{0.45}$Au$_{0.55}$; (e) PAN/Ag$_{0.3}$Au$_{0.7}$; (f) PAN/Ag$_{0.9}$Pd$_{0.1}$, (g) PAN/Ag$_{0.77}$Pd$_{0.23}$; (h) PAN/Ag$_{0.67}$Pd$_{0.33}$; (i) PAN/Ag$_{0.54}$Pd$_{0.46}$ bimetallic nanofibers.
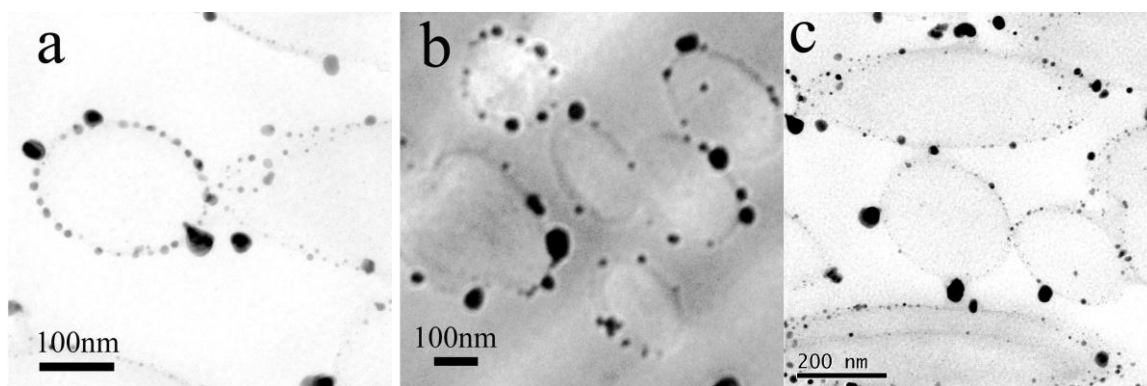
**Fig. S3** Cross-sectional TEM images of (a) PAN/Ag nanofibers, (b) PAN/$Ag_{0.6}Au_{0.4}$ nanofibers and (c) PAN/$Ag_{0.9}Pd_{0.1}$ nanofibers
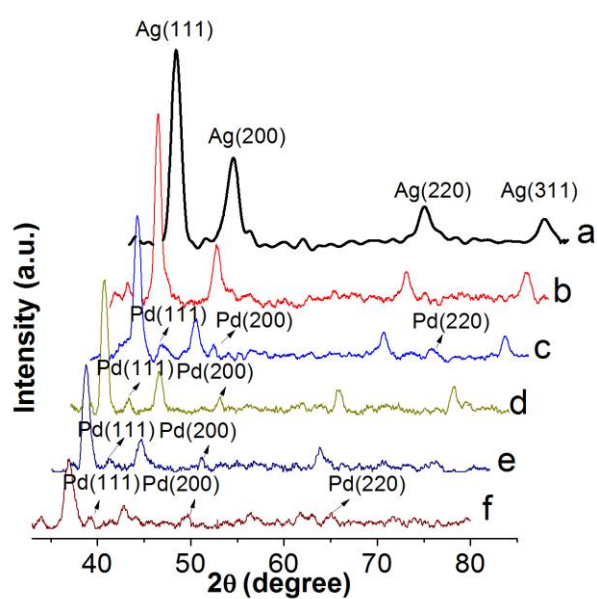
Fig.S4 The XRD pattern of (a) PAN/Ag, (b) PAN/$Ag_{0.80}Au_{0.20}$, (c) PAN/$Ag_{0.90}Pd_{0.10}$. (d) PAN/$Ag_{0.77}Pd_{0.23}$. (e) PAN/$Ag_{0.67}Pd_{0.33}$. (f) PAN/$Ag_{0.54}Pd_{0.46}$ bimetallic nanofibers.
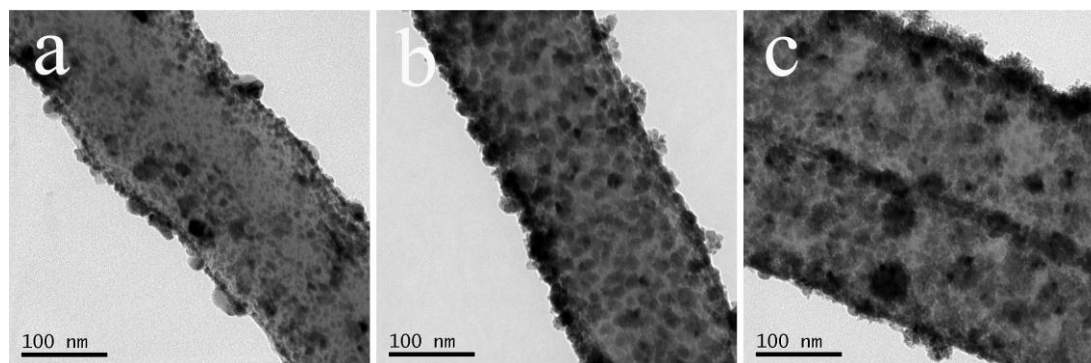
Fig. S5 TEM images of single fiber for PAN/$Ag_{0.77}Pd_{0.23}$ (a), PAN/$Ag_{0.67}Pd_{0.33}$ (b) and PAN/$Ag_{0.54}Pd_{0.46}$ (c) bimetallic nanofiber
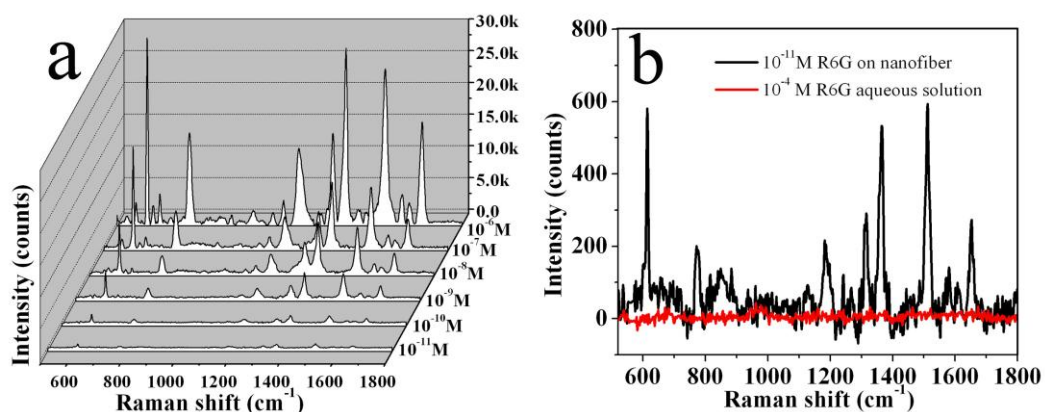
Fig. S6 (a) SERS spectra of R6G (10^{-6}-10^{-11}M) absorbed on PAN/$Ag_{0.6}Au_{0.4}$ bimetallic nanofibers. (b) SERS spectrum of R6G (10^{-11}M) absorbed on PAN/$Ag_{0.6}Au_{0.4}$ bimetallic nanofibers and Raman spectrum of R6G aqueous solution (10^{-4} M).
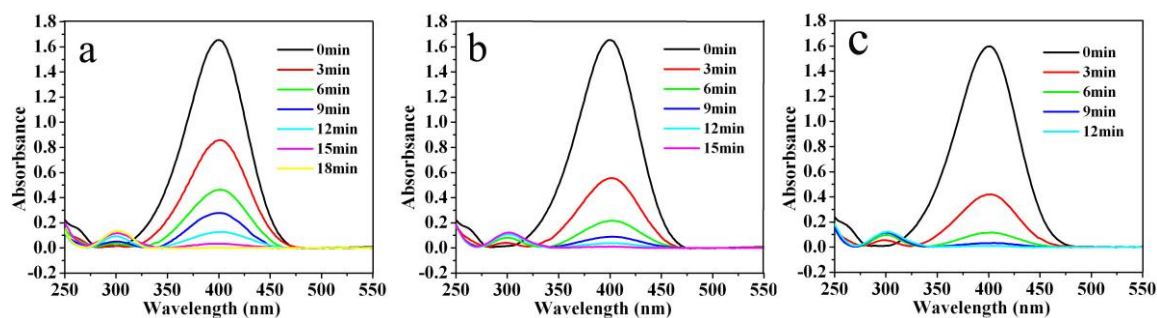

Fig. S7 Time dependent UV-vis absorption spetra for the reduction of 4-NP by $NaBH_4$ in the presence of: (a) PAN/Ag; (b) PAN/$Ag_{0.6}Au_{0.4}$; (c) PAN/$Ag_{0.9}Pd_{0.1}$ bimetallic nanofibers.
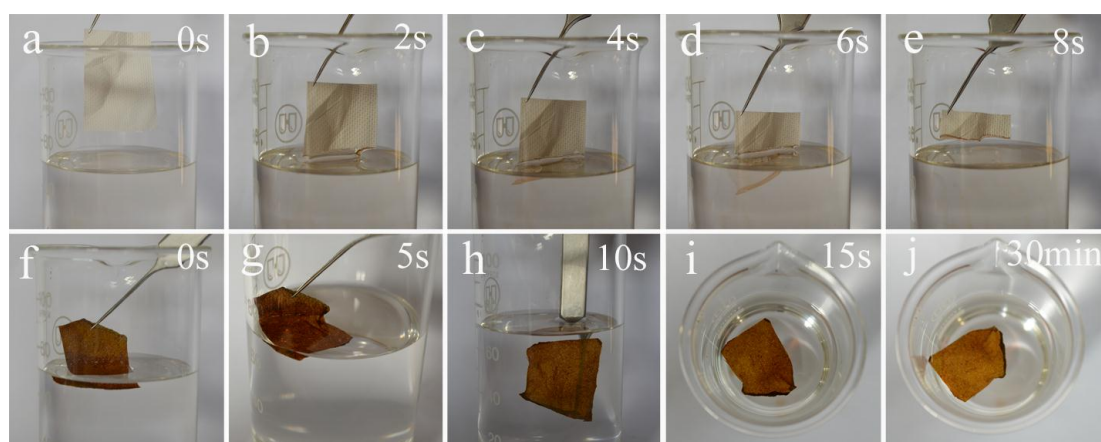
Fig. S8 Photos of PAN nanofibers mats (a-e) and PAN/$Ag_{0.60}Au_{0.40}$ nanofibrous mats (f-j) in DMF solution at different time interval
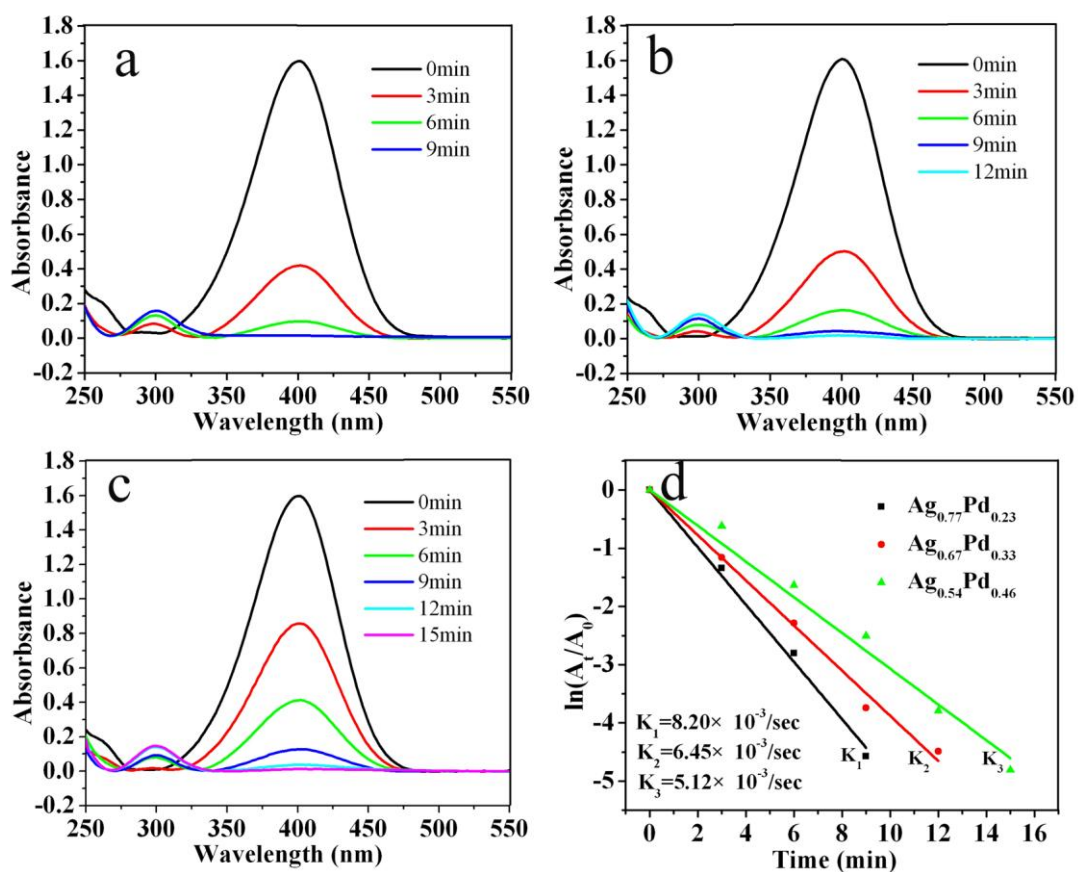
Fig. S9 Time dependent UV-vis absorption spetra for the reduction of 4-NP by $NaBH_4$ in the presence of: (a) $PAN/Ag_{0.77}Pd_{0.23}$; (b) $PAN/Ag_{0.67}Pd_{0.33}$; (c) $PAN/Ag_{0.54}Pd_{0.46}$ bimetallic nanofibers.; (d) Plot of $\ln(A_t/A_0)$ as a function of time for the reduction of 4-NP by $NaBH_4$ catalyzed by $PAN/Ag_{0.90}Pd_{0.10}$, $PAN/Ag_{0.77}Pd_{0.23}$, $PAN/Ag_{0.67}Pd_{0.33}$, and $PAN/Ag_{0.54}Pd_{0.46}$ bimetallic nanofibers.
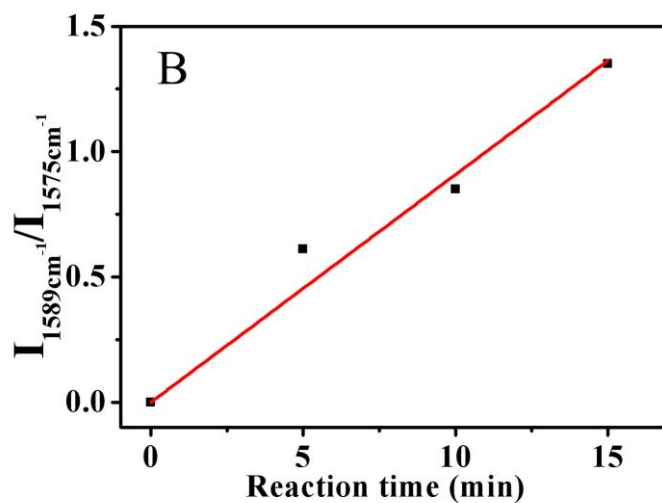
Fig. S10 The relationship between the ratio of intensity of the 1589 cm^{-1} to the 1575 cm^{-1} and reaction time.