

Electronic Supplementary Information for

Facile immobilization of gold nanoparticles into electrospun polyethyleneimine/polyvinyl alcohol nanofibers for catalytic applications

Xu Fang,^{ab} Hui Ma,^b Shili Xiao,^c Mingwu Shen,^b Rui Guo,^b Xueyan Cao^b and Xiangyang Shi^{*abd}

Fabrication and characterization of AuNP-containing PEI/PVA cast films

The PEI/PVA mixture solution (total polymer concentration of 12%) with a mass ratio of PEI/PVA at 1:3 that was used for the formation of electrospun nanofibers was used for the cast film formation. The cast films formed on aluminum foil were crosslinked and processed via an approach similar to the PEI/PVA nanofibers. Then, the crosslinked PEI/PVA cast films were used as nanoreactors to immobilize AuNPs in a manner similar to the crosslinked PEI/PVA nanofibers. The formed AuNP-containing PEI/PVA cast films were characterized using TGA and TEM as described in the Experimental Section.

Figure S1 shows the TGA curves of PEI/PVA cast film before and after immobilization of AuNPs. The less weight loss clearly indicated the successful immobilization of AuNPs. Based on the TGA data, the loading of the AuNPs in the PEI/PVA cast films was estimated to be 15.7%, which was slightly higher than that of PEI/PVA nanofibers. TEM image (Figure S2) of the PEI/PVA cast films after AuNP immobilization clearly confirmed the existence of the AuNPs. However, unlike the AuNPs formed in the PEI/PVA nanofibers, the AuNPs formed in the cast films had a certain degree of aggregation.

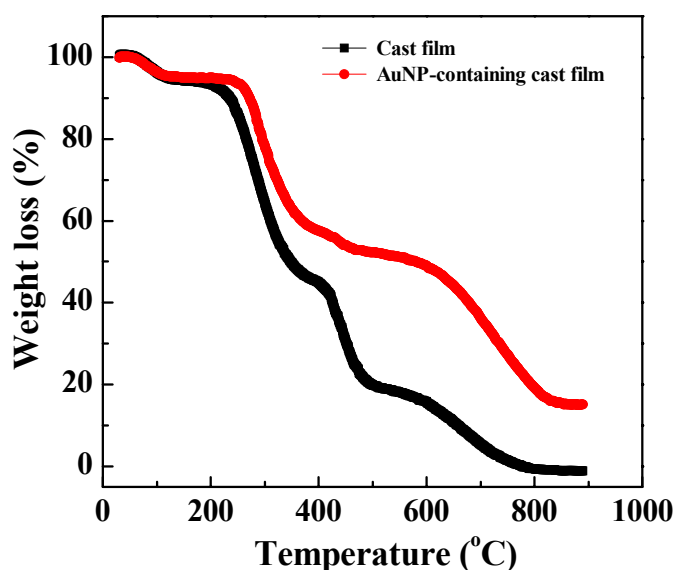


Figure S1. TGA profiles of the PEI/PVA cast films before and after AuNP immobilization.

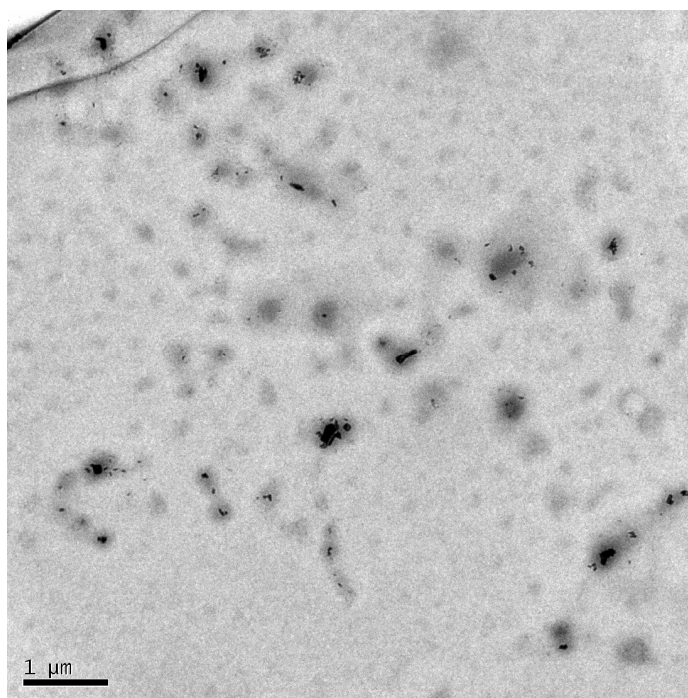


Figure S2. TEM image of the AuNP-containing PEI/PVA cast film.

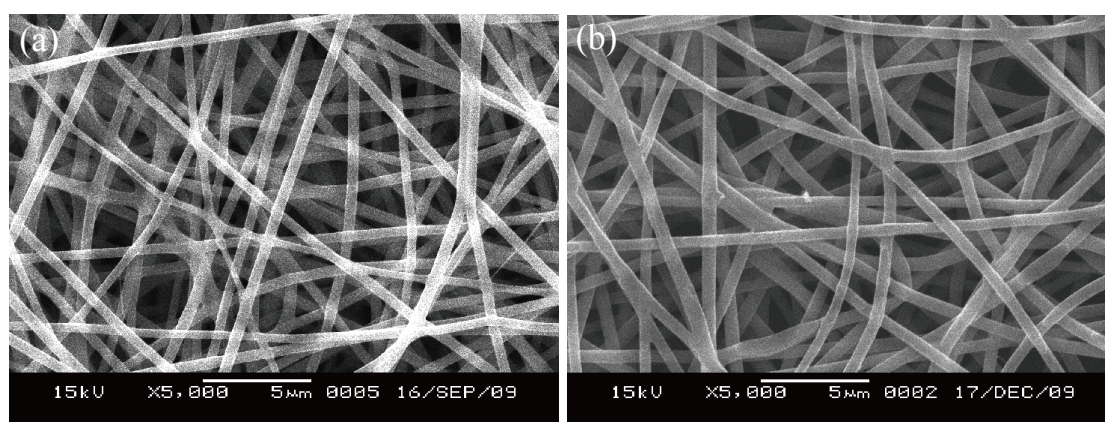


Figure S3. SEM images of freshly prepared PEI/PVA nanofibers (a) and the crosslinked PEI/PVA nanofibers after immersing into water for a week (b).

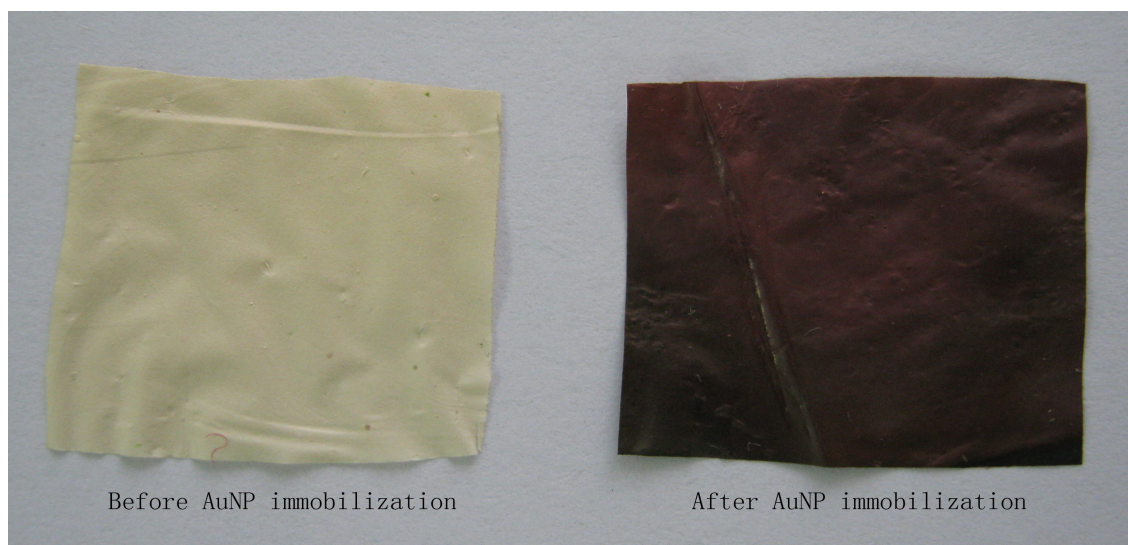


Figure S4. Digital photograph of the free-standing crosslinked PEI/PVA nanofibrous mat before (left panel) and after (right panel) Au NP immobilization. The dimension of the mat is approximately 2.0×1.8 cm (length × width).

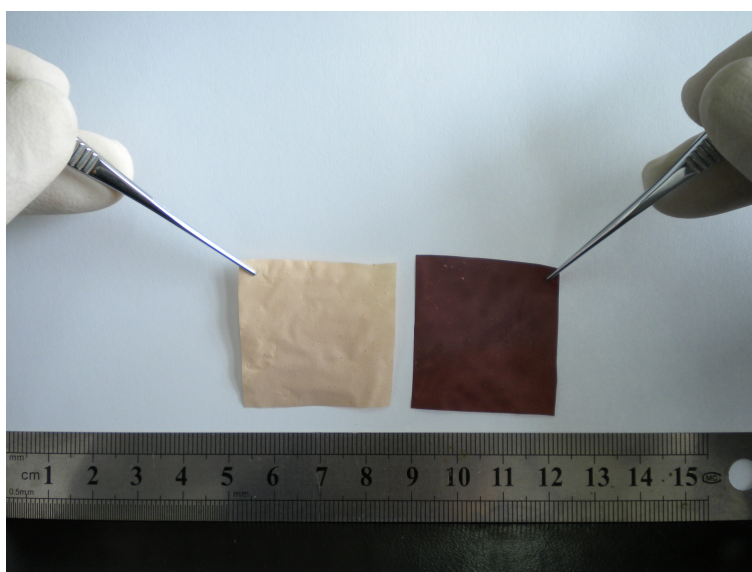


Figure S5. The photograph of the PEI/PVA nanofibrous mats before (left) and after (right) AuNP immobilization.

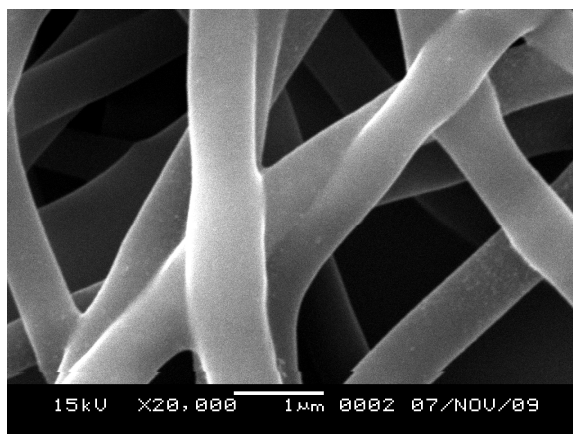


Figure S6. High magnification SEM image of AuNP-containing PEI/PVA nanofibers.

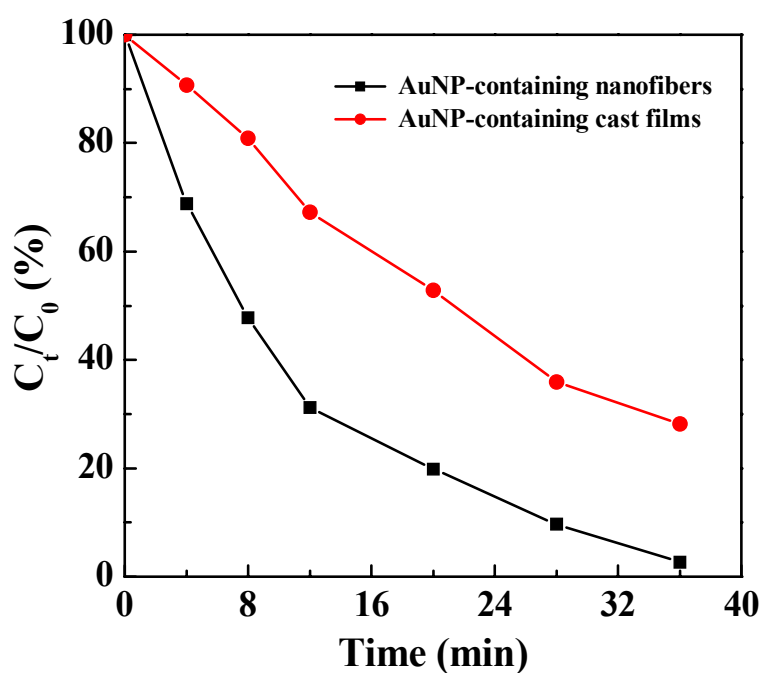


Figure S7. Comparison of the efficiency of the AuNPs-containing PEI/PVA nanofibrous mats and AuNPs-containing PEI/PVA cast films to catalyze the transformation of 4-nitrophenol to 4-aminophenol.

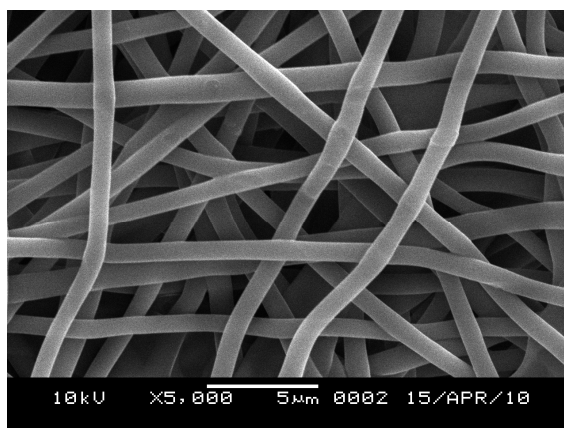


Figure S8. SEM image of AuNP-containing PEI/PVA nanofibers after catalytic transformation of

4-nitrophenol to 4-aminophenol for 3 times.

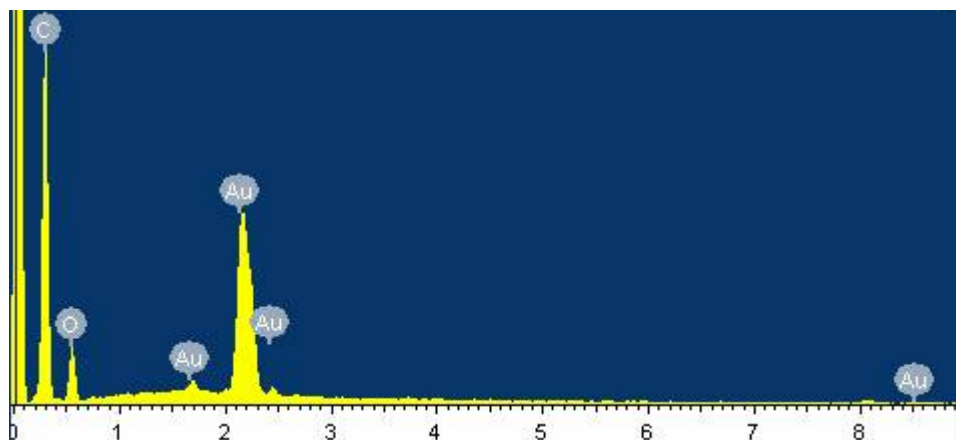


Figure S9. EDS spectrum of the AuNP-immobilized PEI/PVA nanofibers after catalytic transformation of 4-nitrophenol to 4-aminophenol for 3 times.

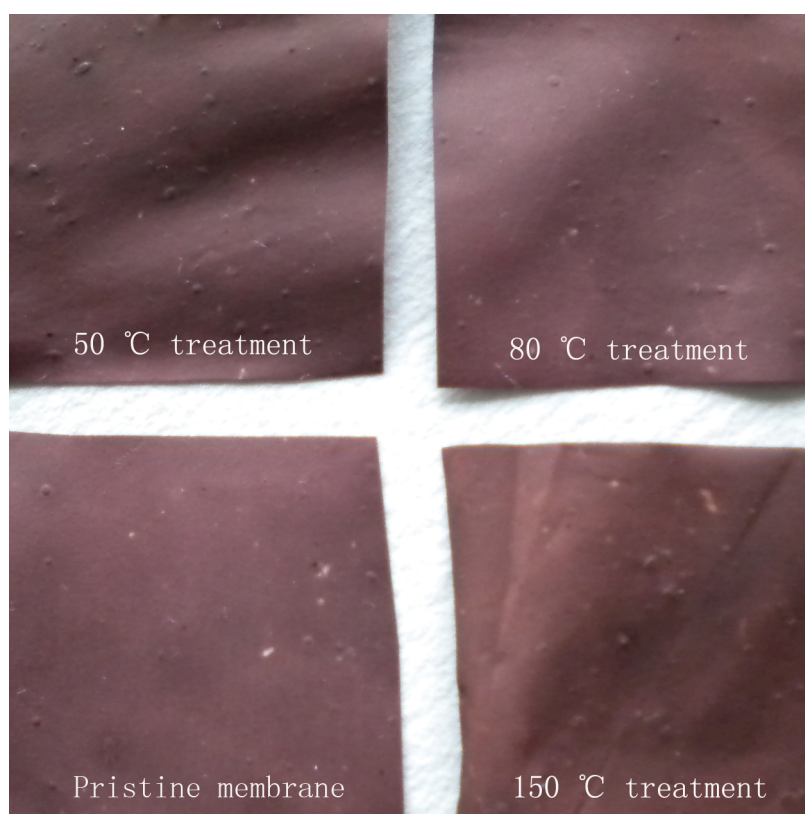


Figure S10. Photographs of the AuNP-containing PEI/PVA nanofibrous membranes treated at 50 °C, 80 °C, and 150 °C, respectively for 1 h. The bottom left panel shows the pristine membrane without treatment.