

Supporting Information

Biogenic synthesis of Pd-based nanoparticles with enhanced catalytic activity

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Table S1. Apparent Rate Constant k Values, Activity Parameter and Pd/S Atomic Ratios of Different Catalysts in the 4-NP Reduction Reaction

	rate constant (s^{-1})	activity parameter ($s^{-1} g_{Pd}^{-1}$)	Pd/S atomic ratio
Bio-Pd	3.7×10^{-4}	260	0.5
Bio-Pd-300	1.4×10^{-3}	610	0.6
Bio-Pd-400	5.0×10^{-3}	1200	1.2
Bio-Pd-500	7.8×10^{-4}	81	1.8
commercial Pd/C	4.2×10^{-3}	1200	No S

Table S2. Comparison of the Catalytic Activity among the State-of-Art Pd Based Catalysts and the Bio-Pd Synthesized in This Work

catalyst	4-NP: NaBH ₄ (mol/mol)	time for 4-NP total reduction	ref.
Pd@MOF core-shell nanocomposite	1:200	5 min	1
Pd@Ni core-shell NPs	3:250	290 seconds	2
dendrimer-templated Pd NPs	1:100	300 seconds	3
Pd nanoparticles	1:50	20 min	4
PdAu bimetallic NPs	1:50	16 min	4
Bio-Pd	1:100	10 min	This work

1. Wang, C.; Zhang, H.; Feng, C.; Gao, S.; Shang, N.; Wang, Z., Multifunctional Pd@MOF core-shell nanocomposite as highly active catalyst for p-nitrophenol reduction. *Catalysis Communications* **2015**, *72*, 29-32.
2. Dong, Z.; Le, X.; Dong, C.; Zhang, W.; Li, X.; Ma, J., Ni@Pd core-shell nanoparticles modified fibrous silica nanospheres as highly efficient and recoverable catalyst for reduction of 4-nitrophenol and hydrodechlorination of 4-chlorophenol. *Applied Catalysis B: Environmental* **2015**, *162*, 372-380.
3. Noh, J.-H.; Meijboom, R., Synthesis and catalytic evaluation of dendrimer-templated and reverse microemulsion Pd and Pt nanoparticles in the reduction of 4-nitrophenol: The effect of size and synthetic methodologies. *Applied Catalysis A: General* **2015**, *497*, 107-120.
4. Liu, C.-H.; Liu, J.; Zhou, Y.-Y.; Cai, X.-L.; Lu, Y.; Gao, X.; Wang, S.-D., Small and uniform Pd monometallic/bimetallic nanoparticles decorated on multi-walled carbon nanotubes for efficient reduction of 4-nitrophenol. *Carbon* **2015**, *94*, 295-300.

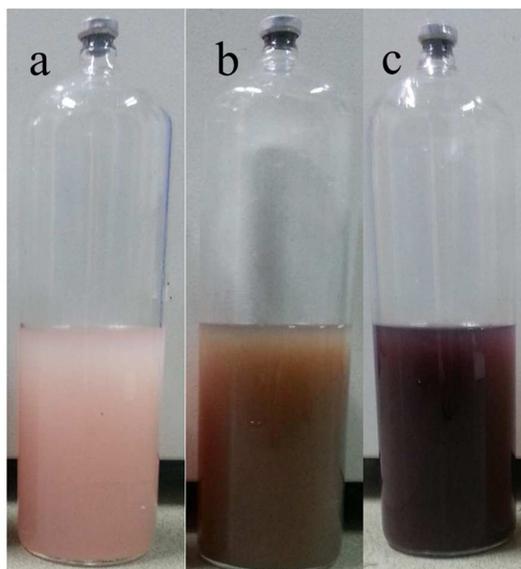


Figure S1 Images of (a) *Shewanella oneidensis*; (b) after NaPdCl_4 addition; and (c) after HAuCl_4 addition in the serum bottles

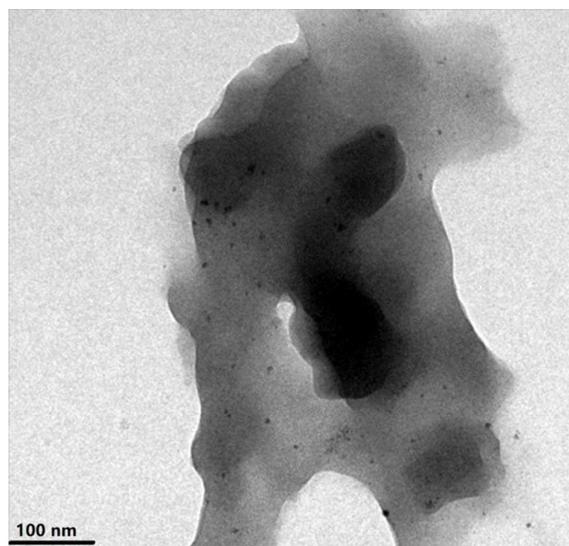


Figure S2. TEM image of the freezing-dried Bio-Pd.

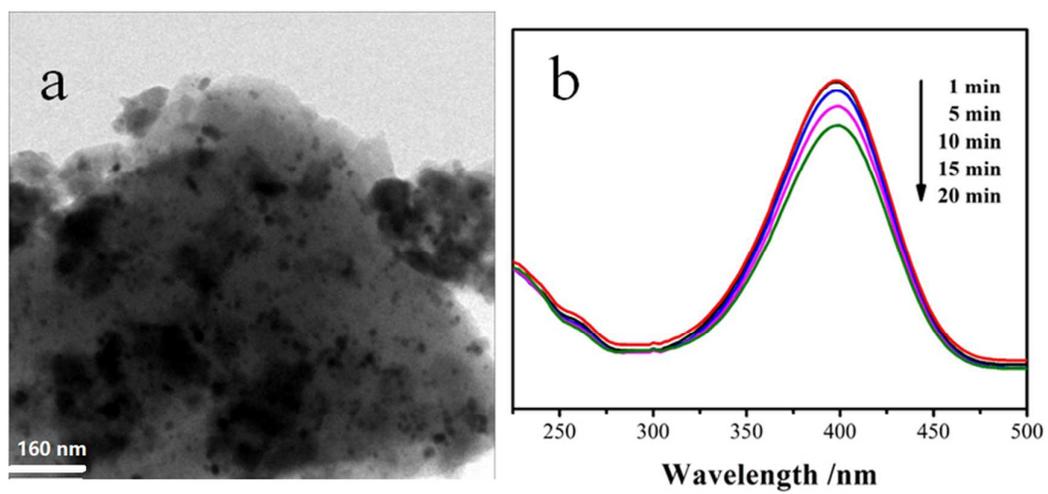


Figure S3 (a) TEM image of the bio-supported Pd heated at 400 °C without KOH for 3 h; and (b) time-dependent UV-vis absorption spectra of the mixed 4-NP and NaBH₄ solution with the catalyst

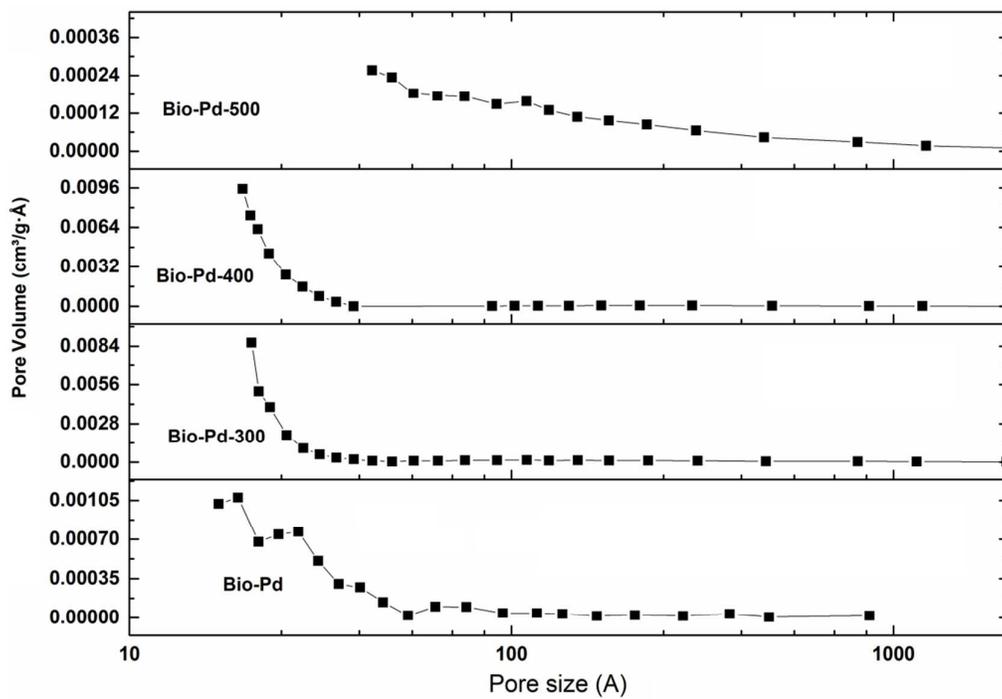


Figure S4. Pore size distribution of the bio-Pd samples after different heat treatments

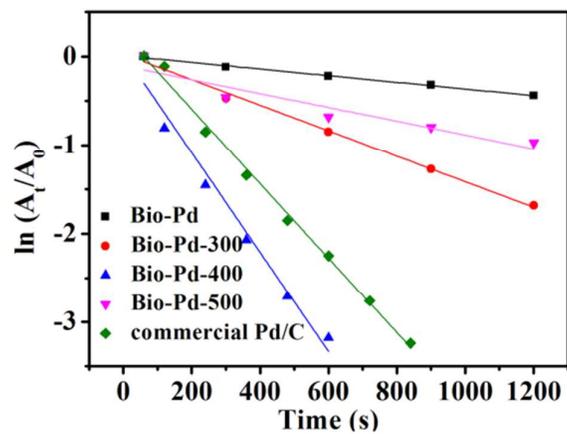


Figure S5. $\ln(A_t/A_0)$ versus time for the 4-NP reduction over the catalysts with different Pd loadings (A_t is the absorbance at wavelength of 400 nm at time t , and A_0 is absorbance at wavelength of 400 nm at initial time).