

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

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Supporting Information

Erbium Oxide as a Novel Support for Palladium Nanocatalysts with Strong Metal-Support Interactions: Remarkable Catalytic Performance in Hydrogenation Reactions

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Fig. S1 FT-IR spectrum of 1.75 wt% Pd-Er₂O₃ nanocatalysts.

Fig. S2 (a) XPS survey scan spectrum of the thermally treated 1.75 wt% Pd-Er₂O₃ (b) Pd 3d spectrum of the NaBH₄ treated Pd-Er₂O₃ nanocatalysts.

Fig. S3 Reusability of 1.75 wt%Pd-Er₂O₃.

Table S1 Comparison of 4-NP reduction to 4-AP over different Pd-based catalysts

Table S2 Hydrogenation of the functional nitroarenes.

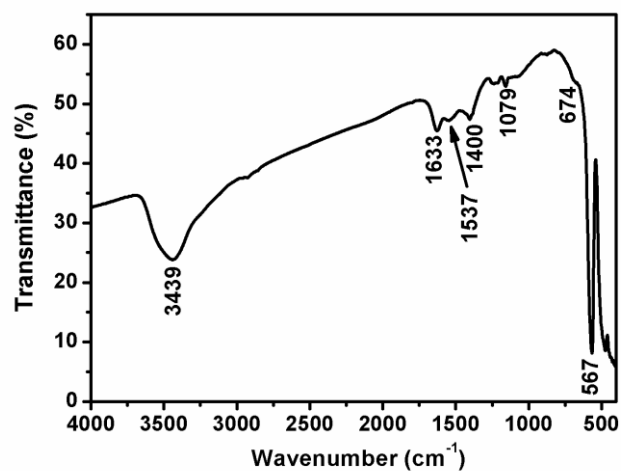


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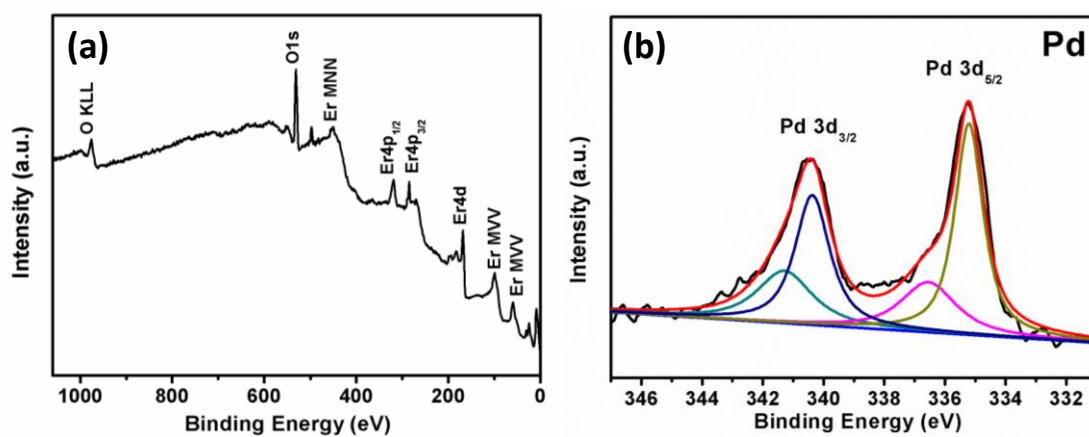


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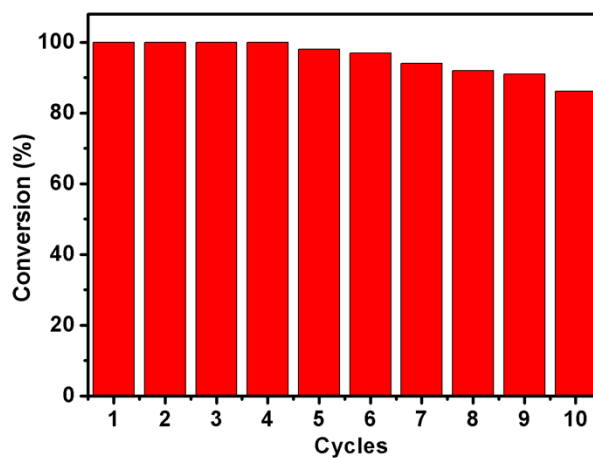
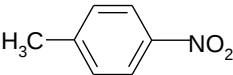
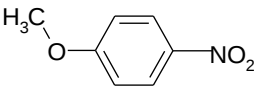
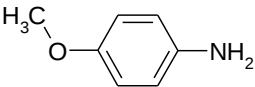
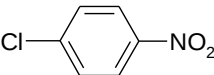
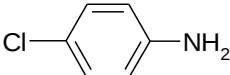
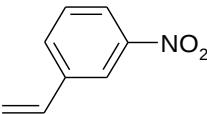
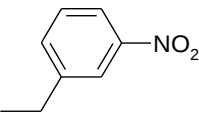


Fig. S3 Reusability of 1.75 wt%Pd-Er₂O₃.

Table S1 Comparison of 4-NP reduction to 4-AP over different catalysts.

Entry	Catalysts	Pd/Pt content	Reductant	k(s ⁻¹)	References
1	Pd-Er ₂ O ₃	1.75 wt%	H ₂	5.8×10 ⁻³	this work
2	Pt-γ-Fe ₂ O ₃ @mSiO ₂ RBBS	3.9 wt%	H ₂	1.88×10 ⁻⁴	1
3	Pd-Er ₂ O ₃	1.75 wt%	NaBH ₄	1.34×10 ⁻²	this work
4	Pd/g-C ₃ N ₄	1.5 wt%	NaBH ₄	7.29×10 ⁻³	2
5	Pd/CeO ₂	2.15 wt%	NaBH ₄	3.92×10 ⁻²	3
6	Pd/Fe ₃ O ₄ @CeO ₂	1.62 wt%	NaBH ₄	2.15×10 ⁻²	4
7	Pd/TiO ₂	1 wt%	NaBH ₄	1×10 ⁻²	5

Table S2 Hydrogenation of the functional nitroarenes.

Entry	Substrate	Conversion	Main Product	Chemoselectivity
1		100%		100%
2		97.45%		100%
3		100%		76.32%
4		100%		100%

Reaction conditions: nitroarenes: 1 mmol; catalysts: 5 mg; reaction time: 2 h; 1 atm H₂; room temperature.

References:

- [1] L. Shang, R. Shi, G. I. N. Waterhouse, L. Z. Wu, C. H. Tung, Y. D. Yin and T. Zhang, *Small Methods*, 2018, 1800105(1-5).
- [2] C. Du, Y. Guo, X. Q. Gong and G. Lu, *J. Mater. Chem. A*, 2015, **3**, 23230-23239.
- [3] Q. Wang, Y. Li, B. Liu, Q. Dong, G. Xu, L. Zhang and J. Zhang, *J. Mater. Chem. A*, 2015, **3**, 139-147.
- [4] Z. Jin, M. Xiao, Z. Bao, P. Wang and J. Wang, *Angew. Chem., Int. Ed.*, **2012**, 51, 6406-6410.
- [5] M. Imran, A. B. Yousaf, X. Zhou, Y. F. Jiang, C. Z. Yuan, A. Zeb, N. Jiang and A. W. Xu, *J. Phys. Chem. C*, 2017, **121**, 1162-1170.