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# Supplement to: Well-controlled Metal Co-catalysts Synthesised by Chemical Vapour Impregnation for Photocatalytic Hydrogen Production and Water Purification

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## Microscopic images

Low-magnification HAADF-STEM images of Pd, Pt, $Pd_1Pt_1$, and $Pd_sAu_c$ NPs for particle size distribution calculations are shown in Figure S1.[1]

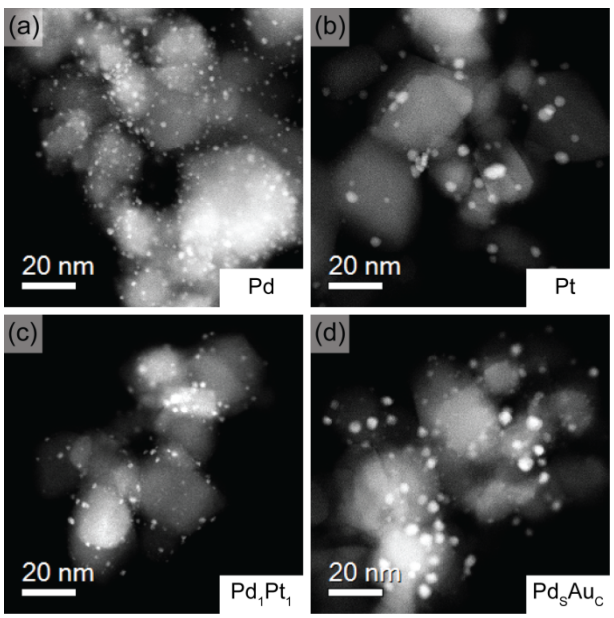


Fig. S1. HAADF-STEM images of Pd, Pt, $Pd_1Pt_1$, and $Pd_sAu_c$ NPs supported on $TiO_2$.[1]

Figure S2 present the typical HAADF-STEM images of metal NPs deposited on $TiO_2$ by CVI method. The sub-nanometer clusters and isolated atoms were also observed.[1]

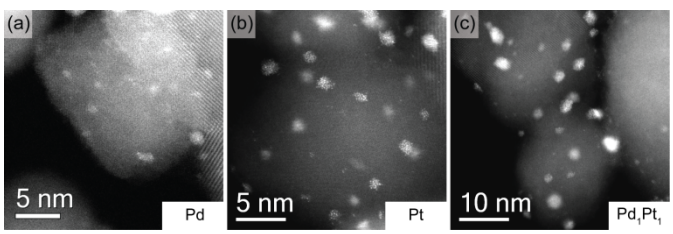


Fig. S2. (a)-(c): Typical HAADF-STEM images of Pd, Pt, and $Pd_1Pt_1$ NPs supported on $TiO_2$ by CVI method, respectively.[1]

Figure S3(a) depicts the Ti 2p spectra of all samples. It is clear that the oxidation state of Ti is found to be 4+, indicating the stoichiometry of the samples equates to $TiO_2$. The C 1s spectra shown in Fig. S3(b) indicate all carbon species on the surface can be assigned to adventitious C.

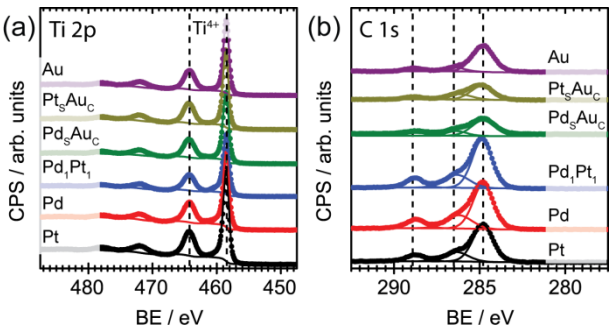


Fig. S3. (a) and (d): High resolution XPS spectra of Ti 2p and C 1s, respectively. The solid and dashed lines are fitting results of the raw data (dots). All catalysts have a metal loading of 2.5 wt%.

## Notes and references

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1. M. M. Forde, L. Kesavan, M. I. bin Saiman, Q. He, N. Dimitratos, J. A. Lopez-Sanchez, R. L. Jenkins, S. H. Taylor, C. J. Kiely and G. J. Hutchings, *ACS Nano*, 2013, **8**, 957.