Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

In situ one-step synthesis of metal-organic frameworks encapsulated naked Pt nanoparticles without additional reductants

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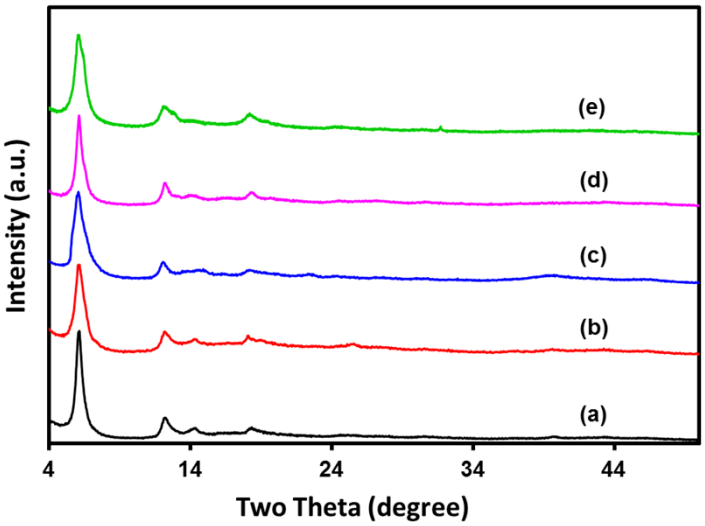

Figure S1. Powder XRD patterns of DUT-5 (a), Pt@DUT-5 with Pt loading of 0.5 wt% (b), 0.8 wt% (c), 1.5 wt% (d), and 0.5 wt% Pt@DUT-5 after catalytic reaction (e)**.**

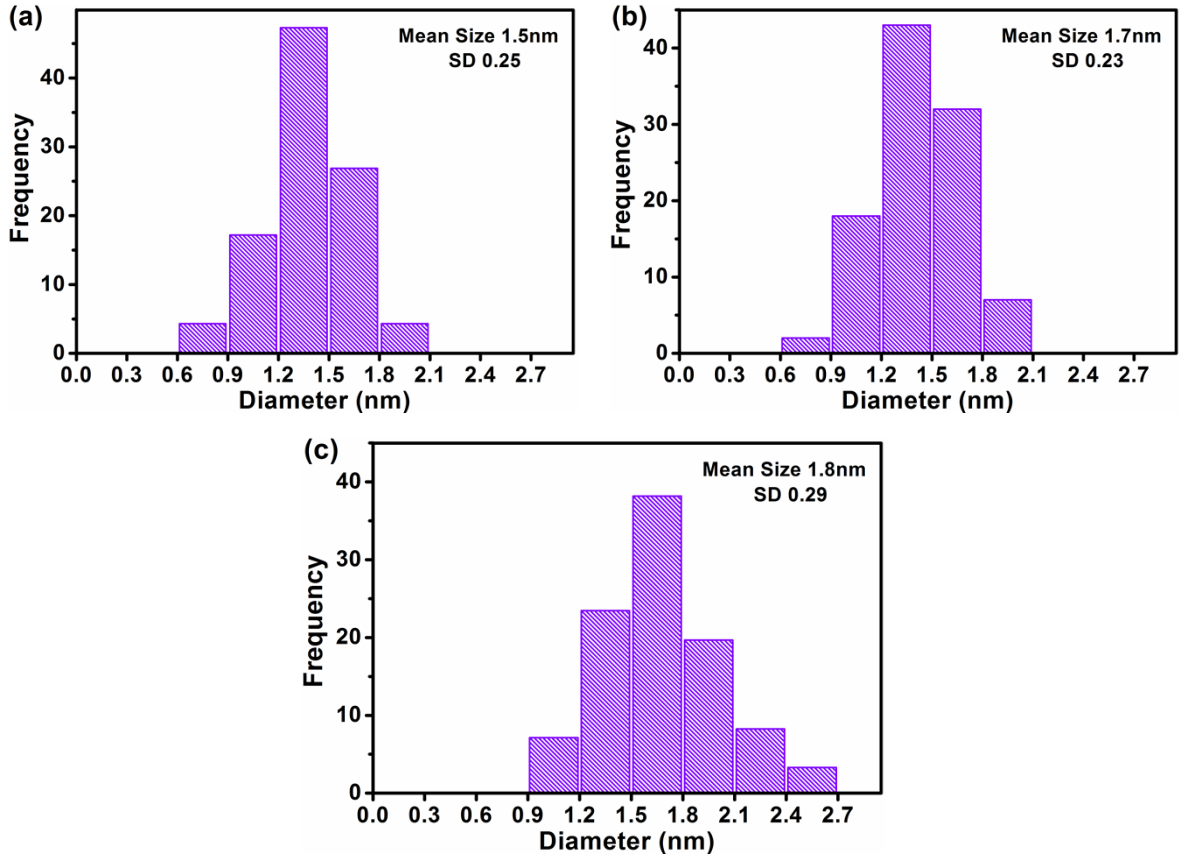

Figure S2. The corresponding particle size distribution histograms of Pt@DUT-5 with Pt loading of 0.5 wt% (a), 0.8 wt% (b), and 1.5 wt% (c), respectively.

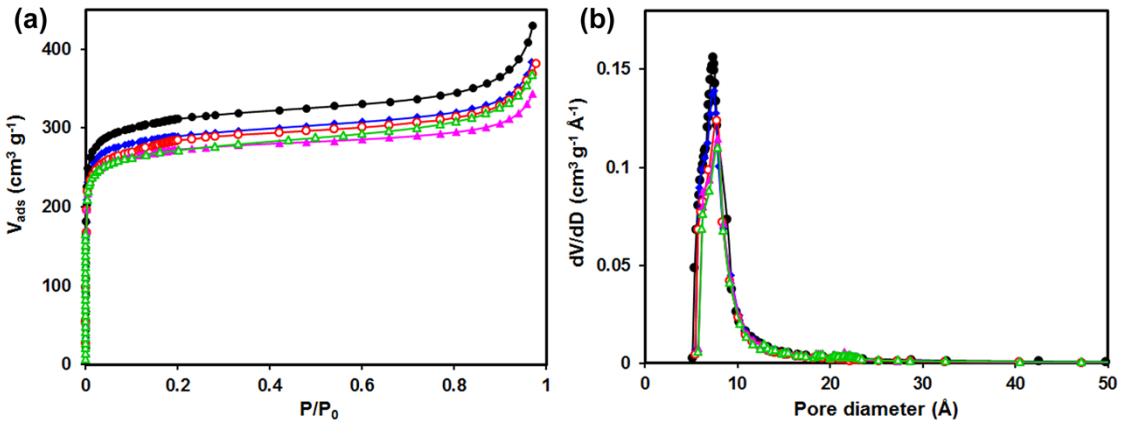

Figure S3. Nitrogen adsorption isotherms (a) and pore-size distribution curves (b) of DUT-5(●), Pt@DUT-5 with Pt loading of 0.5 wt% (○), 0.8 wt% (◆), 1.5 wt% (▲), and 0.5 wt% Pt@DUT-5 after catalytic reaction (Δ).

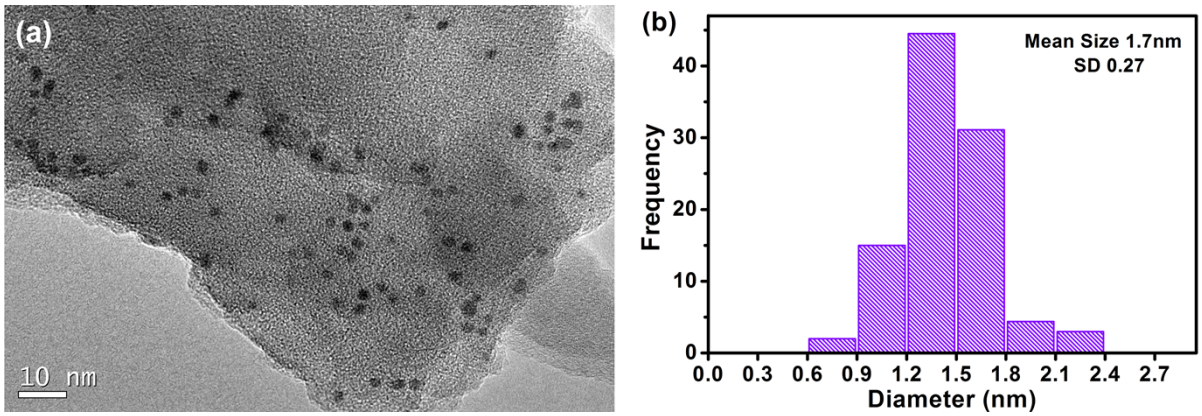

Figure S4. TEM image of 0.5 wt% Pt@DUT-5 after catalytic reaction (a), and the corresponding size distribution of Pt nanoparticles (b).

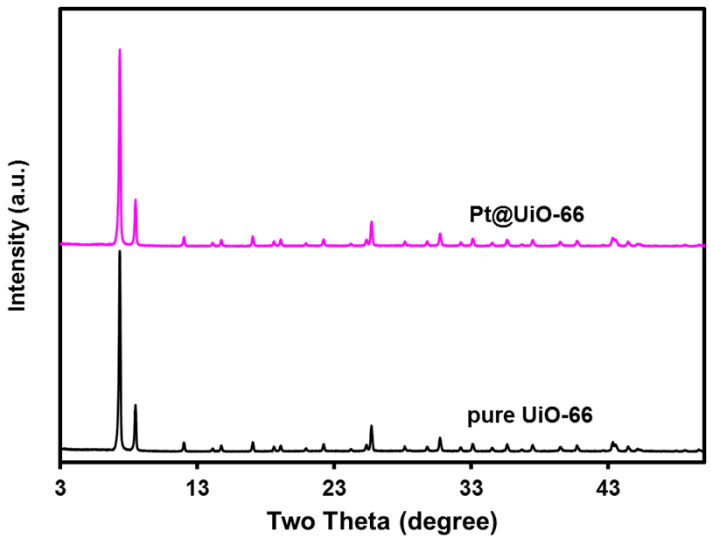

Figure S5. Powder XRD patterns of UiO-66 and 0.5 wt% Pt@UiO-66**.**

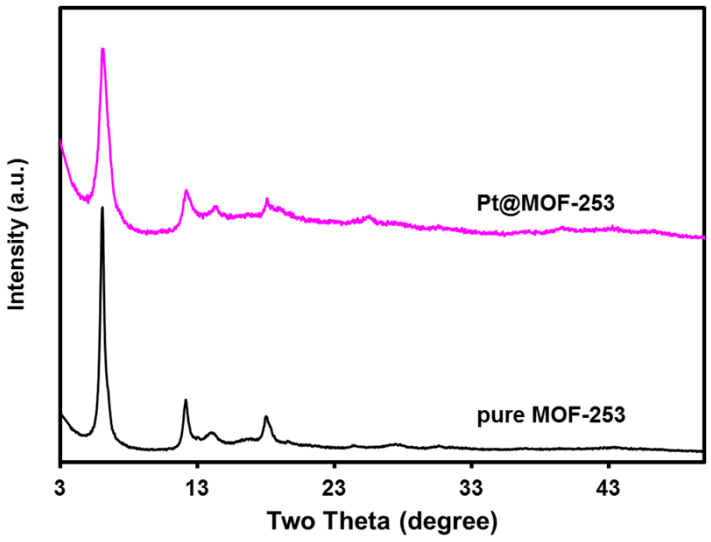

Figure S6. Powder XRD patterns of MOF-253 and 0.5 wt% Pt@MOF-253**.**

Table S1 Results of the oxidation of cinnamyl alcohol.[a]

Entry	Catalyst	Conversion (%)	Selectivity (%)
1	0.5% Pt@DUT-5	>99	>99
2[b]	0.5% Pt@MOF-253	>99	>99
3[c]	0.5% Pt@UiO-66	>99	>99
4	0.5% Pt/DUT-5	38	>99
5	treated 0.5% Pt/DUT-5	45	>99

[a] Reaction conditions: cinnamyl alcohol (1 mmol), catalyst (Pt 1 mol%), toluene (10 mL), 80 °C, 15 h, 1 atm O_2. [b] 10 h. [c] 18 h.

To investigate the effect of surfactants on the reactivity of Pt NPs, the Pt/DUT-5 material prepared by colloidal deposition with PVP as protecting agent was treated at 220 °C for 2 h under N_2 atmosphere. The results (Table S1, entries 4-5) showed that the catalytic activity was enhanced over the Pt/DUT-5 treated at 220 °C as compared to the untreated Pt/DUT-5, which is likely due to the movement or partial decomposition of PVP molecules from the Pt surface at a high temperature, making it easier for reactant to adsorb on the Pt surface (PVP glass transition temperature, 175 °C; decomposition temperature, 435 °C).[1-3]

References

1. W. Zhang, G. Lu, C. Cui, Y. Liu, S. Li, W. Yan, C. Xing, Y. R. Chi, Y. Yang, F. Huo, *Adv. Mater.*, 2014, **26**, 4056.
2. Z. Wang, H. Fu, D. Han, F. Gu, *J. Mater. Chem. A*, 2014, **2**, 20374.
3. R. M. Rioux, H. Song, M. Grass, S. Habas, K. Niesz, J. D. Hoefelmeyer, P. Yang, G. A. Somorjai, *Top. Catal.,* 2006, **39**, 167.