

Supporting information

Dielectric barrier discharge plasma grafting carboxylate groups on Pt/Al₂O₃ catalysts for highly efficient hydrogen release from perhydro-dibenzyltoluene

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$$D_{Pt} = \frac{n_{CO} \times (1 + p_{bridge})}{n_{Pt}} \quad \text{Eq. (S1)}$$

$$r_H = \frac{n_H}{n_{Pt}} \quad \text{Eq. (S2)}$$

$$S_H = r_H - D_{Pt} \quad \text{Eq. (S3)}$$

Where, n_{CO} : the amount of CO adsorption (mol)

p_{bridge} : the proportion of CO bridge adsorption measured by CO-DRIFT in Table 2.

n_{Pt} : the total amount of Pt (mol).

n_H : the mole of adsorbed hydrogen atom

S_H : hydrogen spillover capacity”

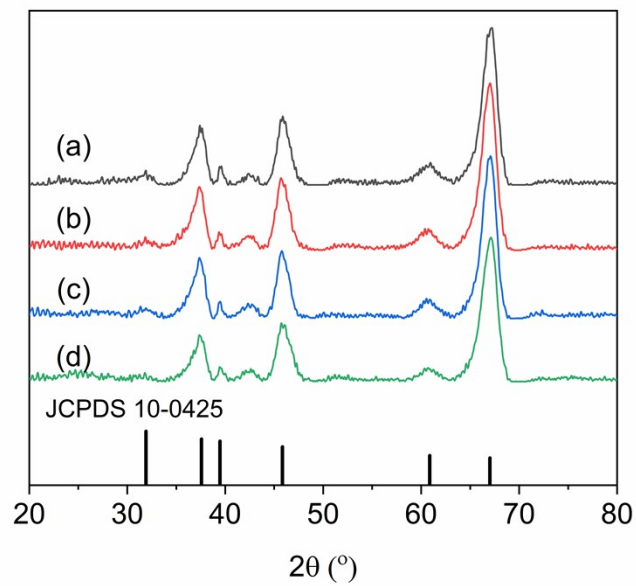


Fig. S1 XRD patterns of (a) Al_2O_3 ; (b) Al_2O_3 -P-Ar; (c) Al_2O_3 -P- CH_4 ; (d) Al_2O_3 -P-HAc and JCPDS 10-0425 (γ - Al_2O_3)

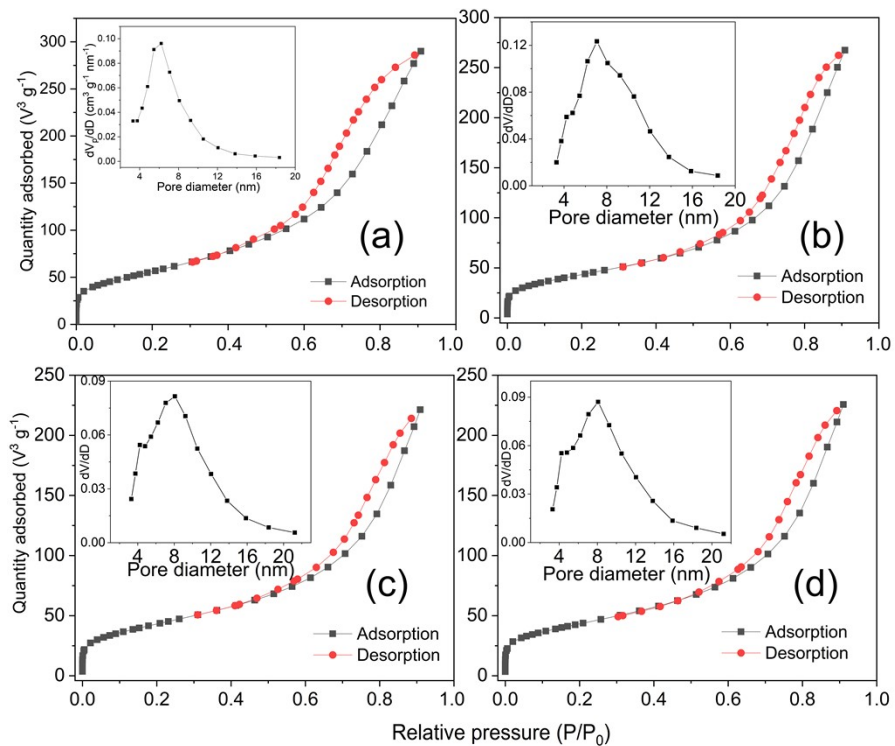


Fig. S2 The N_2 adsorption-desorption isotherms and pore distribution (a) Al_2O_3 ; (b) Al_2O_3 -P-Ar; (c) Al_2O_3 -P- CH_4 ; (d) Al_2O_3 -P-HAc

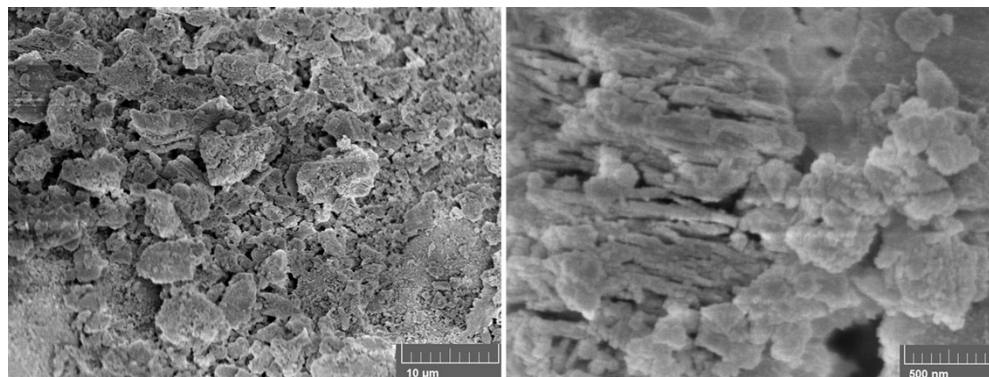


Fig. S3 SEM characterization of Al_2O_3 -P-Ar

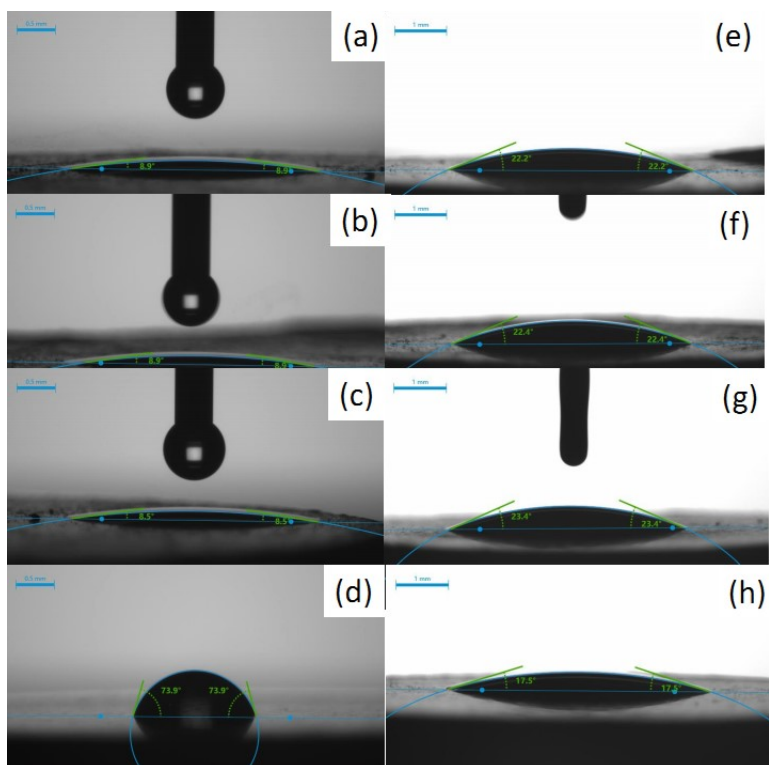


Fig. S4 Contact angle of water and DBT: (a)H₂O on Al₂O₃; (b)H₂O on Al₂O₃-P-Ar; (c) H₂O on Al₂O₃-P-CH₄; (d) H₂O on Al₂O₃-P-HAc; (e) DBT on Al₂O₃; (f) DBT on Al₂O₃-P-Ar; (g) DBT on Al₂O₃-P-CH₄ ;(h) DBT on Al₂O₃-P-HAc

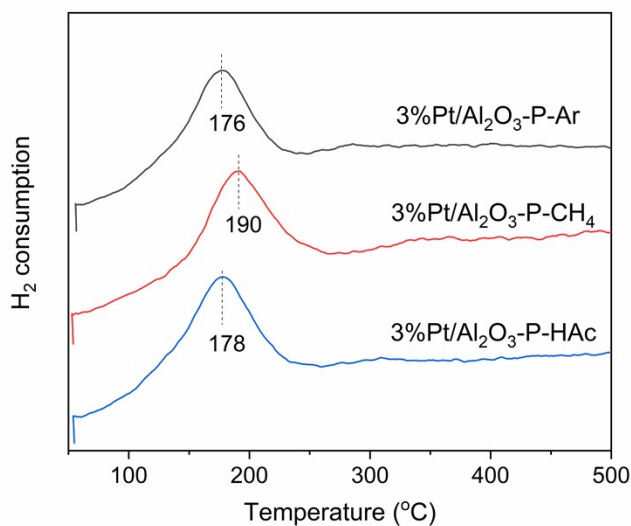


Fig. S5 TPR results of different catalysts

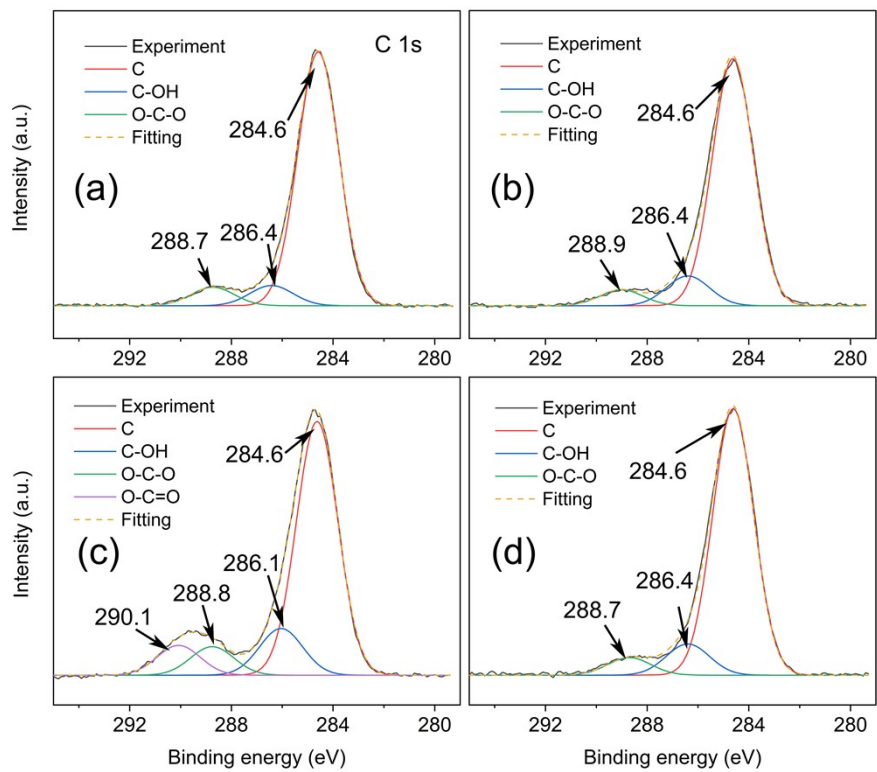


Fig. S6 XPS C 1s spectra of (a) 3% Pt/Al₂O₃-P-Ar; (b) 3% Pt/Al₂O₃-P-CH₄; (c) 3% Pt/Al₂O₃-P-HAc; and (d) 3% Pt/Al₂O₃-P-SO₂-Pt.

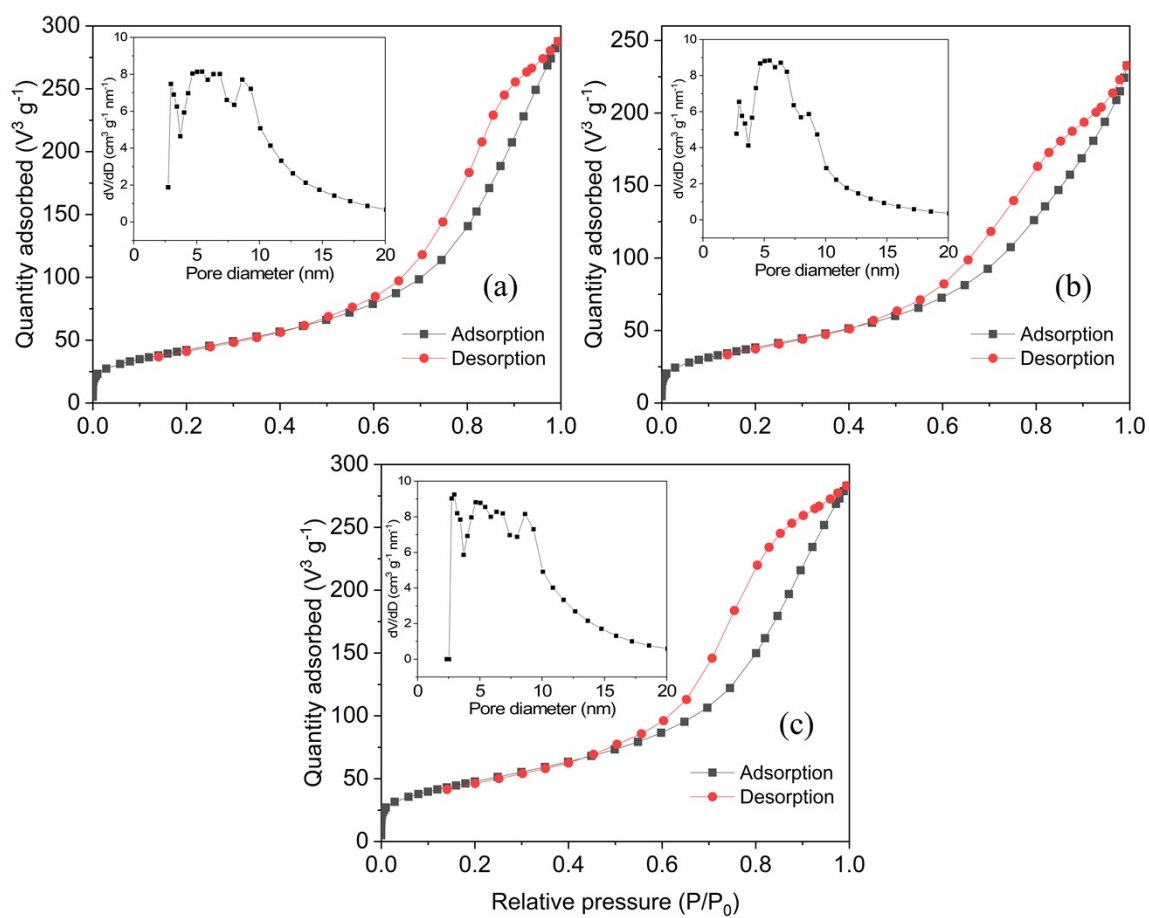


Fig. S7 The N_2 adsorption–desorption isotherms and pore distribution (a) 3% Pt/ Al_2O_3 -P-Ar(R); (b) 3% Pt/ Al_2O_3 -P- CH_4 (R); (c) 3% Pt/ Al_2O_3 -P-HAc(R)