

1 Supporting Information

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3 **Hydrophobically modified mesoporous silica supported Pt as a dual-function of**
4 **adsorbent buffer-catalysis for toluene removal under low-temperature**

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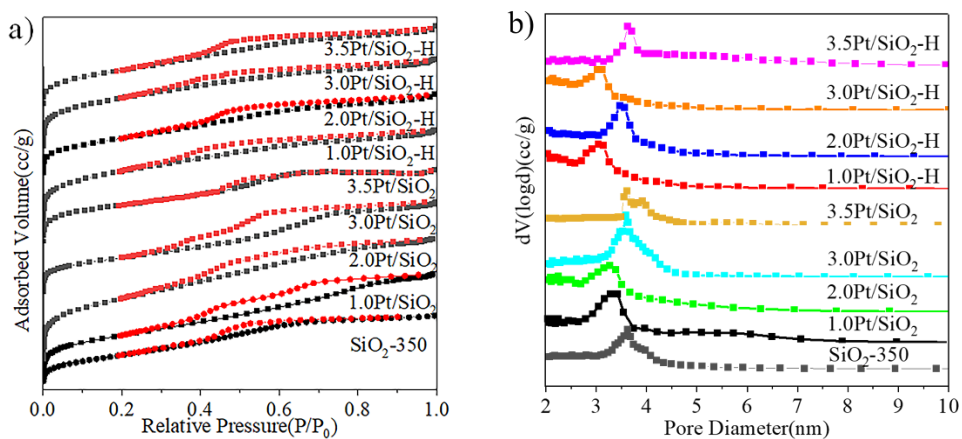
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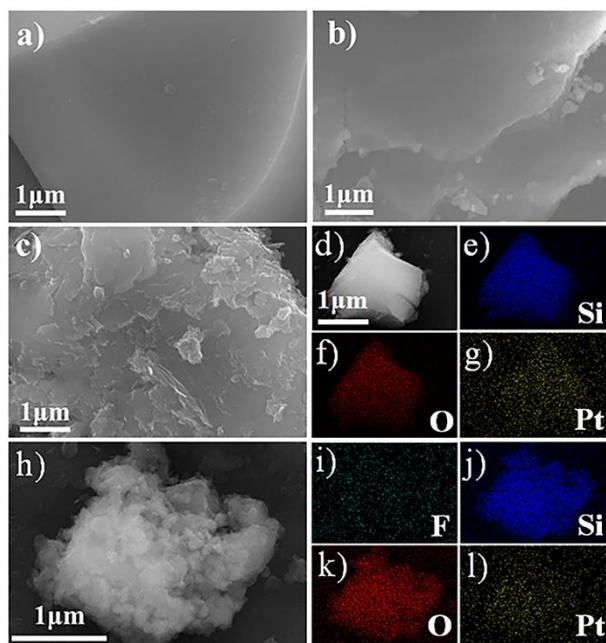
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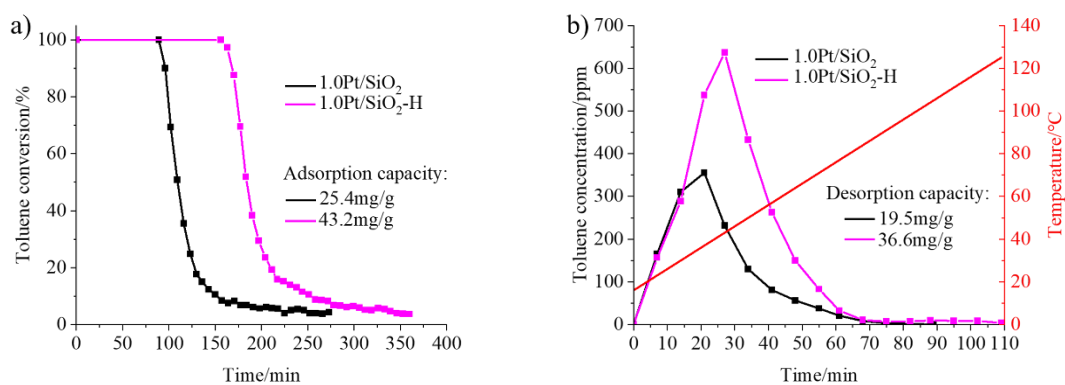
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Figure S1. (a) N₂ adsorption-desorption isotherm curves and (b) pore size distributions of the as-synthesized catalysts, and their enlarged patterns in the pore diameter range of 2.5-5 nm are shown inset in (b).



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Figure S2. Sem images of (a) SiO₂-350, (b) 3.0Pt/SiO₂, (c) 3.0Pt/SiO₂-H, and EDS images of (d-g) Si, O, Pt elements for 3.0Pt/SiO₂, and (h-l) Si, O, Pt, F elements of 3.0Pt/SiO₂-H.



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32 Figure S3. Toluene (a) adsorption and (b) desorption capacity of 1.0Pt/SiO₂

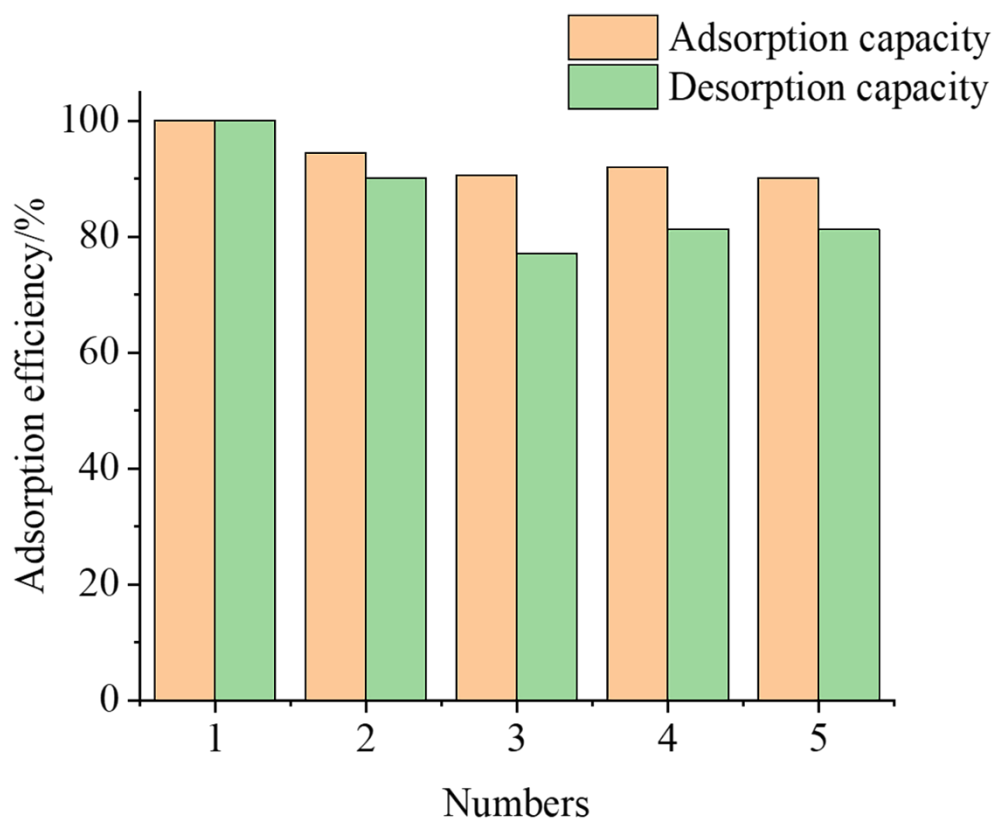
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and 1.0Pt/SiO₂-H.

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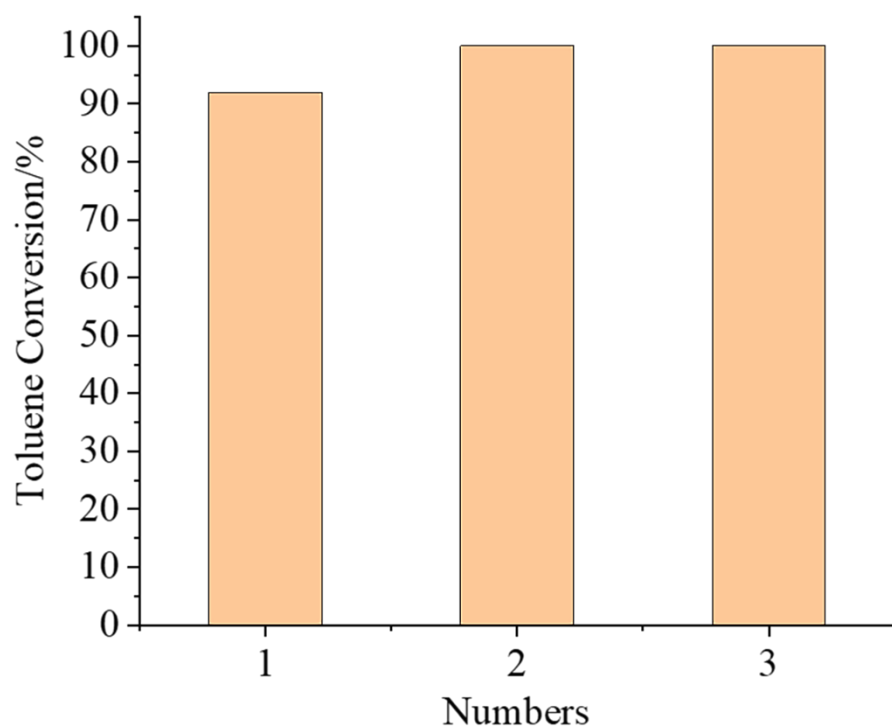


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38 Figure S4. The cyclability of adsorption and desorption capacity for 3.0Pt/SiO₂-H

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42 Figure S5. The cyclability of catalytic performance for 3.0Pt/SiO₂-H at 130 °C

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44 **Table S1**

45 Binding energy and area percentages of Pt in the samples analyzed by XPS spectra

Catalyst	Binding energy/eV						Area/%		
	Pt ⁰ 4f _{7/2}	Pt ²⁺ 4f _{7/2}	Pt ⁴⁺ 4f _{7/2}	Pt ⁰ 4f _{5/2}	Pt ²⁺ 4f _{5/2}	Pt ⁴⁺ 4f _{5/2}	Pt ⁰ 4f	Pt ²⁺ 4f	Pt ⁴⁺ 4f
3.0Pt/SiO ₂	70.7	71.4	73.8	74.0	74.7	77.1	25.2	46.3	28.5
3.0Pt/SiO ₂ -H	70.0	70.7	73.1	73.3	74.0	76.4	23.1	50.8	26.1

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