

## Electronic Supplementary Information (ESI)

### **Aromatization of n-C<sub>7</sub> ~ n-C<sub>9</sub> Alkanes on Pt/KZSM-5(deAl) Catalyst**

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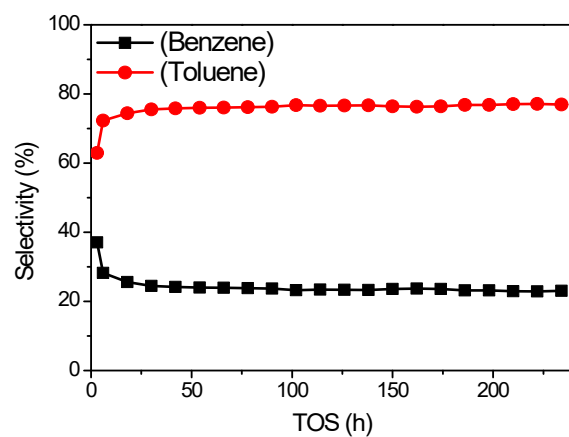
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**Table S1.** Catalytic results for n-heptane aromatization over different Pt/ZSM-5 catalysts.

Performance	Catalysts		
	Pt/HZSM-5	Pt/HZSM-5(deAl)	Pt/KZSM-5(deAl)
Conversion	93.4	96.2	97.6
Methane	14.3	12.7	9.50
C <sub>2</sub> -C <sub>6</sub>	63.1	54.4	9.30
C <sub>7</sub> -isomers	1.70	1.53	1.32
C <sub>7</sub> -alkenes	3.30	2.53	1.56
Total Aromatics	17.0	28.7	75.3

Reaction conditions: 550 °C, WHSV of 2 h<sup>-1</sup>, TOS = 12 h, ambient pressure and H<sub>2</sub>/n-alkane of 6/1.



**Fig. S1** Distribution of aromatic products in n-heptane aromatization at different reaction times over Pt/KZSM-5(deAl) catalyst.

**Table S2.** Catalytic results for different n-alkanes aromatization over Pt/KZSM-5(deAl).

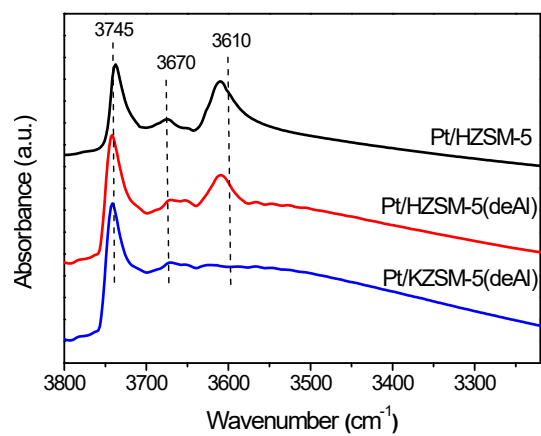
	Alkanes aromatization		
	n-heptane	n-octane	n-nonane
Conversion	96.1	92.8	87.1
Methane	9.40	6.70	8.30
Crackate <sup>a</sup>	7.60	6.50	5.90
Isomers	2.96	1.40	1.10
Alkenes	2.70	1.30	1.20
Total Aros	75.4	82.7	83.4

<sup>a</sup>Crackate represents C<sub>2</sub>-C<sub>6</sub> alkanes for n-heptane aromatization, C<sub>2</sub>-C<sub>7</sub> alkanes for n-octane aromatization and C<sub>2</sub>-C<sub>8</sub> alkanes for n-nonane aromatization, respectively.

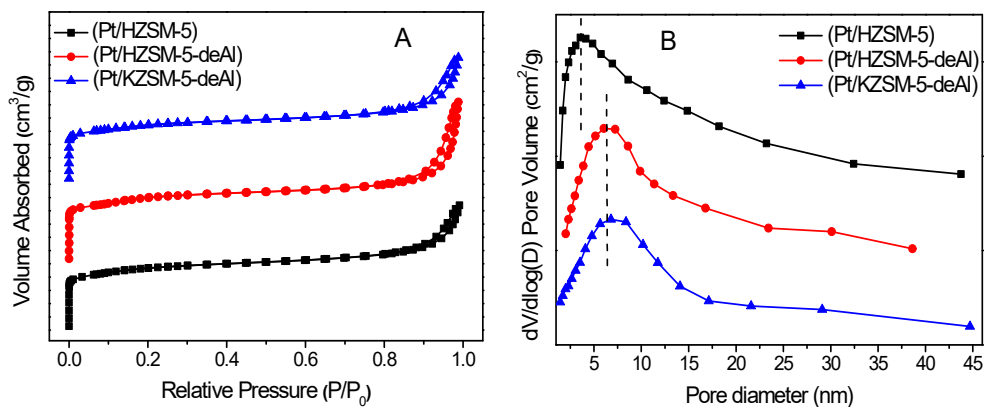
Reaction conditions: 550 °C, WHSV of 2 h<sup>-1</sup>, TOS = 18 h, ambient pressure and H<sub>2</sub>/n-alkane of 6/1.

**Table S3.** Elemental composition of various Pt/ZSM-5 catalysts.

Samples	Si/Al	Pt (wt%)	K (wt%)	Al <sub>EF</sub> /Al <sub>F</sub>
Pt/HZSM-5	27.0	0.71	--	0.053
Pt/HZSM-5(deAl)	60.2	0.65	--	0.068
Pt/KZSM-5(deAl)	58.6	0.69	3.28	0.069



**Fig. S2** FT-IR spectra in the OH-stretching region of various Pt/ZSM-5 catalysts.

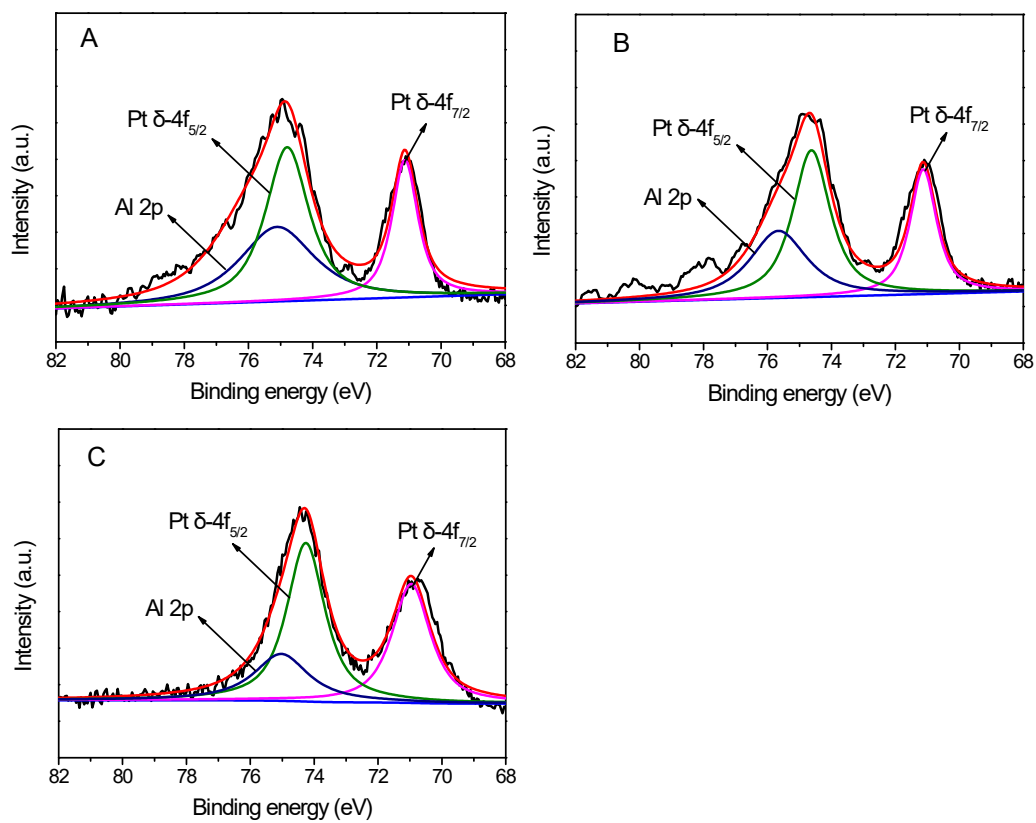


**Fig. S3** N<sub>2</sub> adsorption-desorption isotherms (A) and corresponding pore size distributions of various Pt/ZSM-5 catalysts.

**Table S4.** Acidic properties of various Pt/ZSM-5 catalysts.

Sample	Acid sites content tested by NH <sub>3</sub> -TPD			Acid sites content tested by Py-IR	
	Weak	Strong	Total	Brönsted	Lewis
	(mmol·g <sup>-1</sup> )	(mmol·g <sup>-1</sup> )	(mmol·g <sup>-1</sup> )	(mmol·g <sup>-1</sup> )	(mmol·g <sup>-1</sup> )
Pt/HZSM-5	0.41	0.30	0.71	0.153	0.071
Pt/HZSM-5(deAl)	0.26	0.19	0.45	0.115	0.051
Pt/KZSM-5(deAl)	0.23	0.04	0.27	0.036	0.204

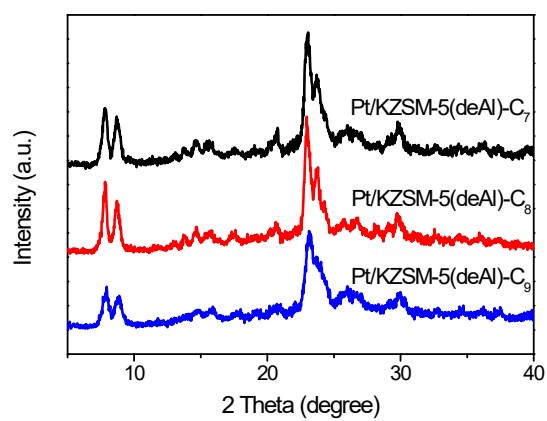




**Fig. S4** Pt4f XPS of Pt/HZSM-5 (A), Pt/HZSM-5(deAl) (B) and Pt/KZSM-5(deAl) (C) catalysts after H<sub>2</sub> reduction.

**Table S5.** Binding energy of various Pt/ZSM-5 and KZSM-5 catalysts.

Samples	Pt $\delta$ -4f <sub>5/2</sub>	Pt $\delta$ -4f <sub>7/2</sub>	K2p <sub>3/2</sub>	K2p <sub>1/2</sub>
Pt/HZSM-5	74.6	71.2	--	--
Pt/HZSM-5(deAl)	74.4	71.1	--	--
Pt/KZSM-5(deAl)	74.2	70.9	297.6	294.7
KZSM-5	--	--	297.4	294.5



**Fig. S5** XRD patterns of spent Pt/KZSM-5(deAl) after n-heptane (Pt/KZSM-5(deAl)-C<sub>7</sub>), n-octane (Pt/KZSM-5(deAl)-C<sub>8</sub>) and n-nonane (Pt/KZSM-5(deAl)-C<sub>9</sub>) aromatization.

**Table S6.** Coking rate of spent Pt/KZSM-5(deAl) catalysts.

Samples	Reaction time (h)	Coking amount (%)	Coking Rate (%)
Pt/KZSM-5(deAl)-C <sub>7</sub>	234	25.7	0.11
Pt/KZSM-5(deAl)-C <sub>8</sub>	102	19.1	0.19
Pt/KZSM-5(deAl)-C <sub>9</sub>	88	20.6	0.23

**Table S7.** Relative band intensity in Raman spectra of Pt/KZSM-5(deAl) catalysts after different n-alkanes aromatization for 24 h.

Sample	I <sub>G</sub> /(%)	I <sub>D</sub> /(%)	I <sub>D</sub> /I <sub>G</sub>
Pt/KZSM-5(deAl)-C <sub>7</sub> -24	34.8	65.2	1.87
Pt/KZSM-5(deAl)-C <sub>8</sub> -24	37.3	62.7	1.68
Pt/KZSM-5(deAl)-C <sub>9</sub> -24	39.5	60.5	1.53