

Article

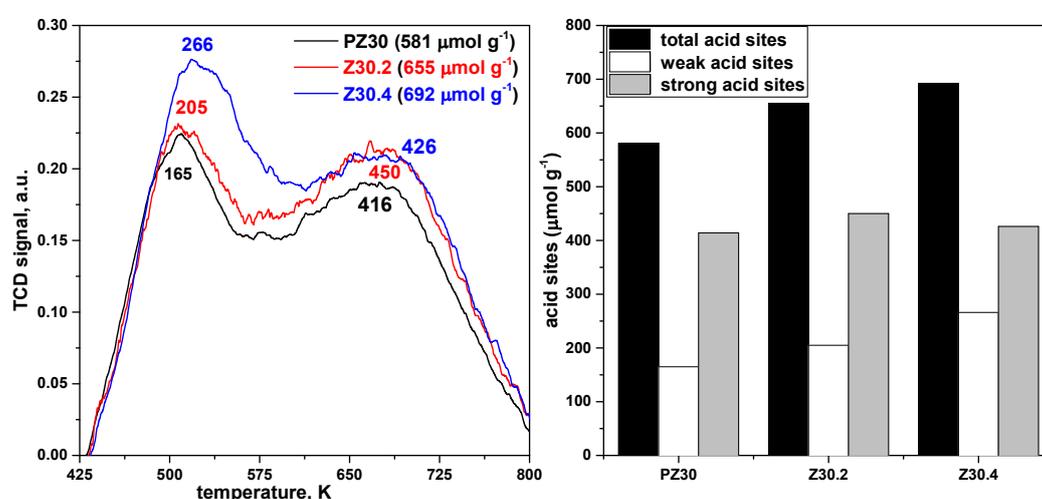
# Desilicated ZSM-5 Zeolites for the Production of Renewable *p*-Xylene via Diels–Alder Cycloaddition of Dimethylfuran and Ethylene

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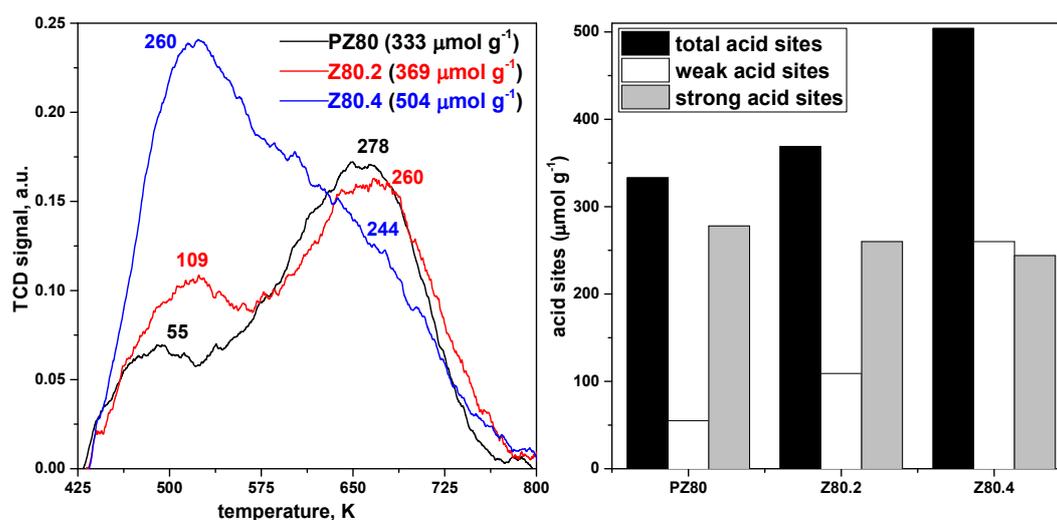
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**Figure S1.** NH<sub>3</sub>-TPD profile (left) and column view of number of acid sites (right) of untreated and treated Z30. Adsorption of NH<sub>3</sub> was performed for 30 min at 150 °C followed by inert flush and TPD up to 700 °C. Columns legend: total acidity (black), weak acid sites (pattern), and strong acid sites (grey).

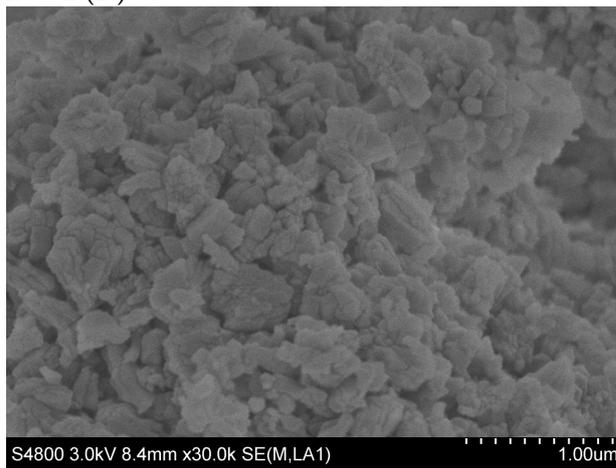


**Figure S2.** NH<sub>3</sub>-TPD profile (left) and column view of number of acid sites (right) of untreated and treated Z80. Adsorption of NH<sub>3</sub> was performed for 30 min at 150 °C followed by inert flush and TPD up to 700 °C. Columns legend: total acidity (black), weak acid sites (pattern), and strong acid sites (grey).

PZ30 (A)



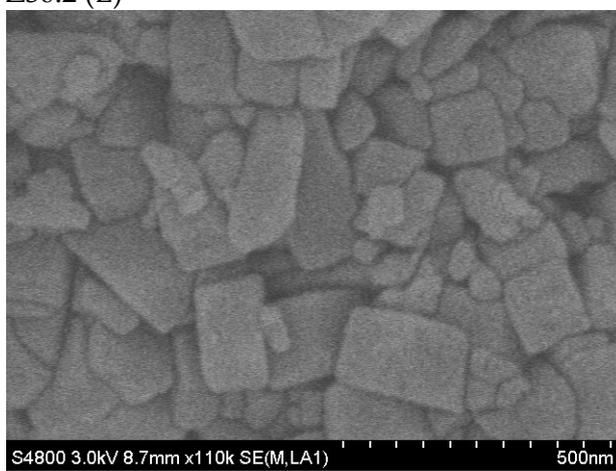
Z30.2 (D)



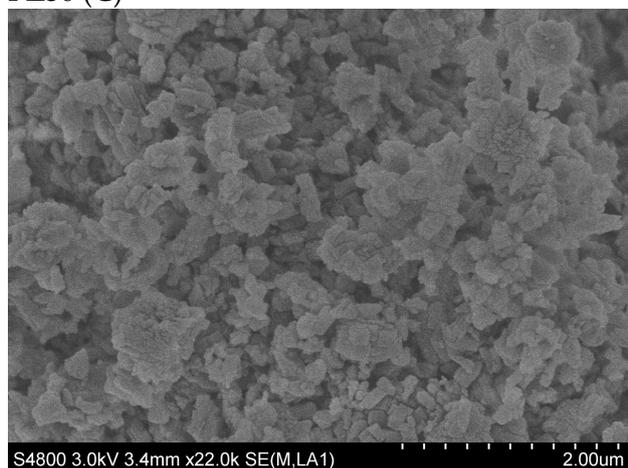
PZ30 (B)



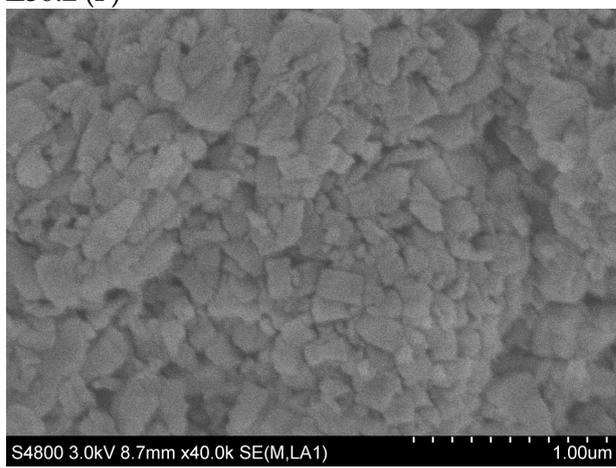
Z30.2 (E)



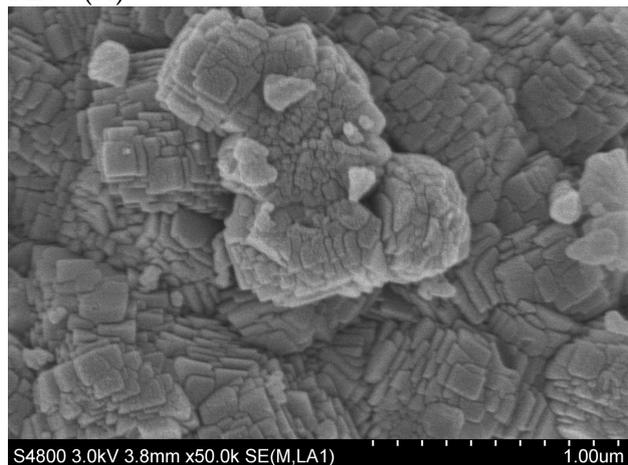
PZ30 (C)



Z30.2 (F)

**Figure S3.** SEM micrographs of PZ30 (A–C) and Z30 (D–F).

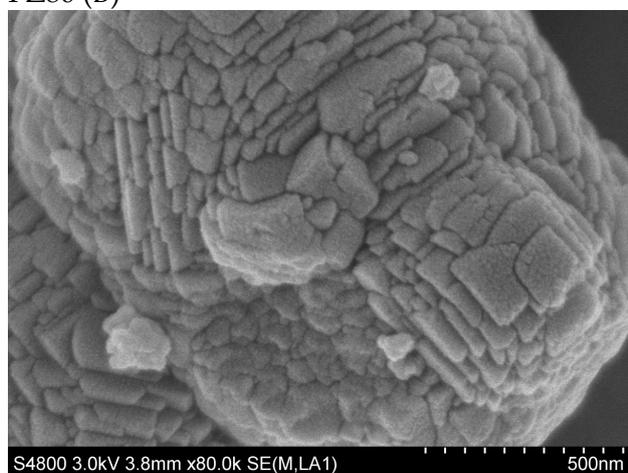
PZ80 (A)



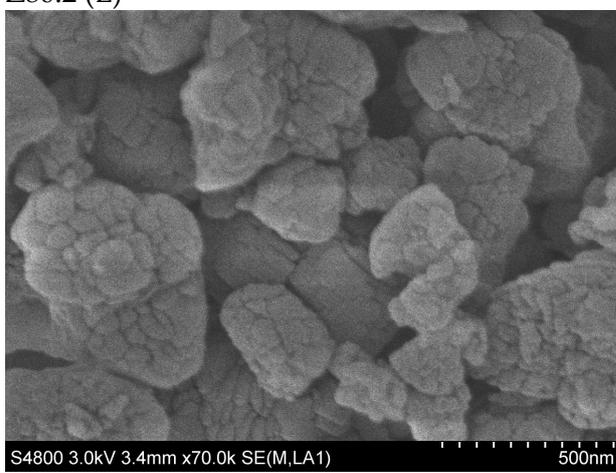
Z80.2 (D)



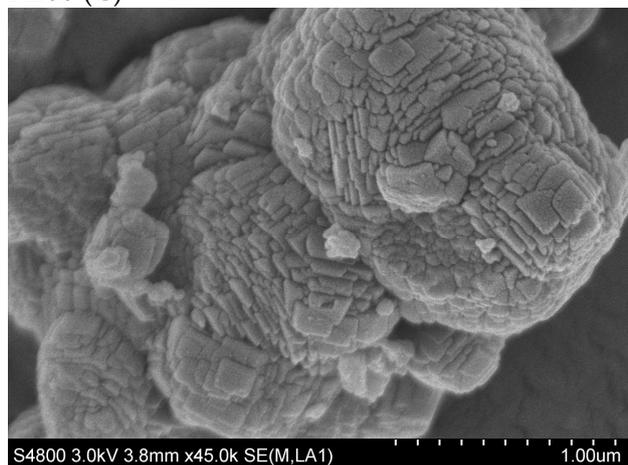
PZ80 (B)



Z80.2 (E)



PZ80 (C)



Z80.2 (F)

**Figure S4.** SEM micrographs of PZ80 (A–C) and Z80.2 (D–F).

**Table S1.** Results of Diels–Alder catalytic testing of DMF and ethylene over untreated and treated H-ZSM-5. Reaction conditions: 5.5 mL DMF, 0.45 mL tridecane (internal standard), 16.5 mL hexane, 110 mg catalyst, 20 h. Conversions and selectivities in %. HDO is 2,5-hexanedione, MCP is 3-methyl-2-cyclopentenone, AP are alkylated products, HA are higher aromatics. The rest is selectivity to unknown products. The carbon mass balance was in all cases >94%.

sample	T <sub>R</sub> , °C	p <sub>total</sub> , bar	X, %	S( <i>p</i> -xylene), %	S(HDO), %	S(MCP), %	S(AP), %	S(HA), %
PZ30	180	40	19.3	43.2	17.7	0.4	6.5	32.2
Z30.2	180	40	36.0	44.1	23.9	1.1	4.4	26.4
Z30.4	180	40	27.1	38.3	26.0	0.7	5.5	29.5
PZ80	180	40	21.3	36.7	16.3	1.9	5.4	39.7
Z80.2	180	40	37.0	34.7	32.3	1.2	2.1	29.7
Z80.4	180	40	36.1	31.1	28.4	1.0	1.8	37.8
PZ80	250	55	16.0	50.7	10.8	1.2	12.2	25.0
Z80.2	250	40*	18.2	48.7	14.5	1.5	15.0	20.3
Z80.2	250	55	51.0	59.4	11.9	2.1	11.5	15.1

\* high hexane vapour pressure, low ethylene pressure.



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