

Control Synthesis of Hierarchical ZSM-5 for Catalytic Fast Pyrolysis of Cellulose to Aromatics

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Table S1. Physical properties of conventional and hierarchical HZSM-5 synthesized using trimethoxymethylsilane (MTS), trimethoxy(propyl)silane (PTS), trimethoxy(octyl)silane (OTS) and hexadecyltrimethoxysilane (HTS) under pre-crystallizing 12 h.

	S_{BET} ,	S_{micro} ,	S_{meso} ,	V_{total} ,	V_{micro} ,	V_{meso} ,
	$\text{m}^2 \cdot \text{g}^{-1}$	$\text{m}^2 \cdot \text{g}^{-1}$	$\text{m}^2 \cdot \text{g}^{-1}$	$\text{cm}^3 \cdot \text{g}^{-1}$	$\text{cm}^3 \cdot \text{g}^{-1}$	$\text{cm}^3 \cdot \text{g}^{-1}$
HZ-Con	324.4	213.2	111.2	0.224	0.115	0.091
ZMTS	369.8	240.4	129.4	0.300	0.125	0.155
ZPTS	408.2	209.9	198.2	0.446	0.109	0.316
ZOTS	390.9	187.2	203.7	0.503	0.099	0.384
ZHTS	362.7	228.5	134.3	0.304	0.119	0.165

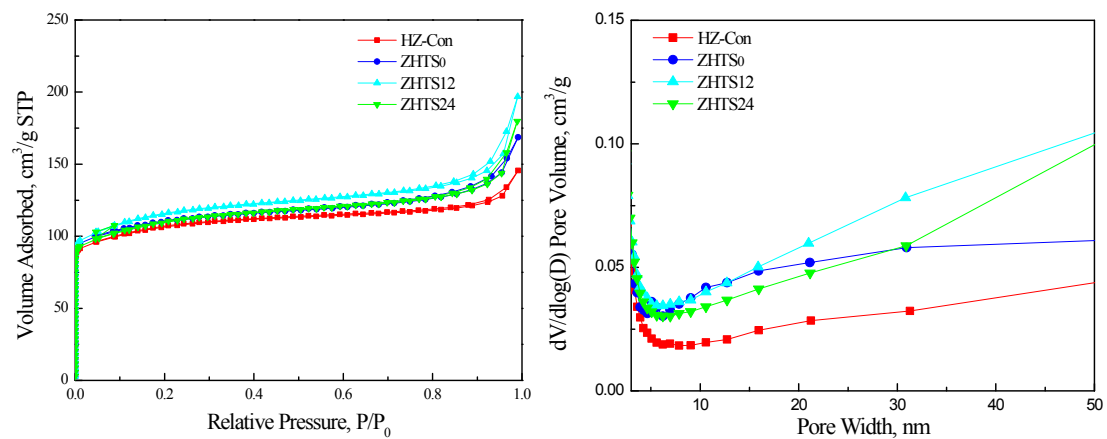


Figure S1. N_2 adsorption–desorption isotherms and pore size distribution of conventional and hierarchical HZSM–5 zeolites prepared by hexadecyltrimethoxysilane (HTS) under pre-crystallizing 0 h, 12 h and 24 h.

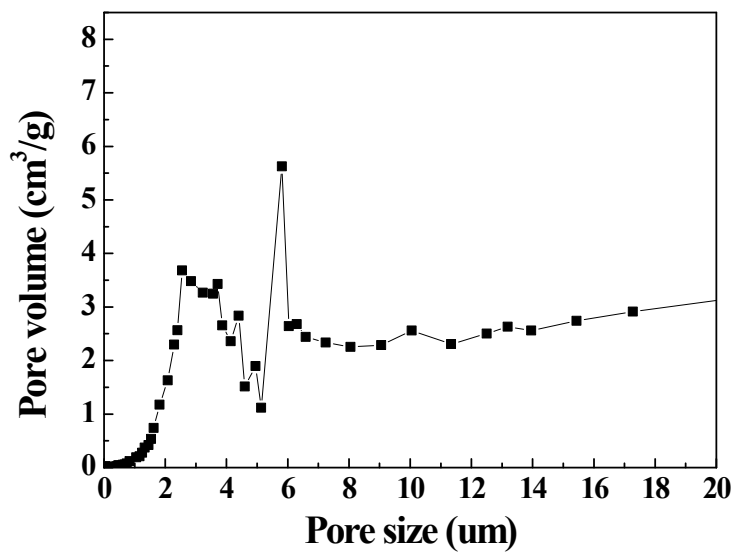


Figure S2. Pore size distribution from mercury injection analysis of the selected hierarchical ZSM-5 prepared by hexadecyltrimethoxysilane (HTS) under pre-crystallizing 12 h.

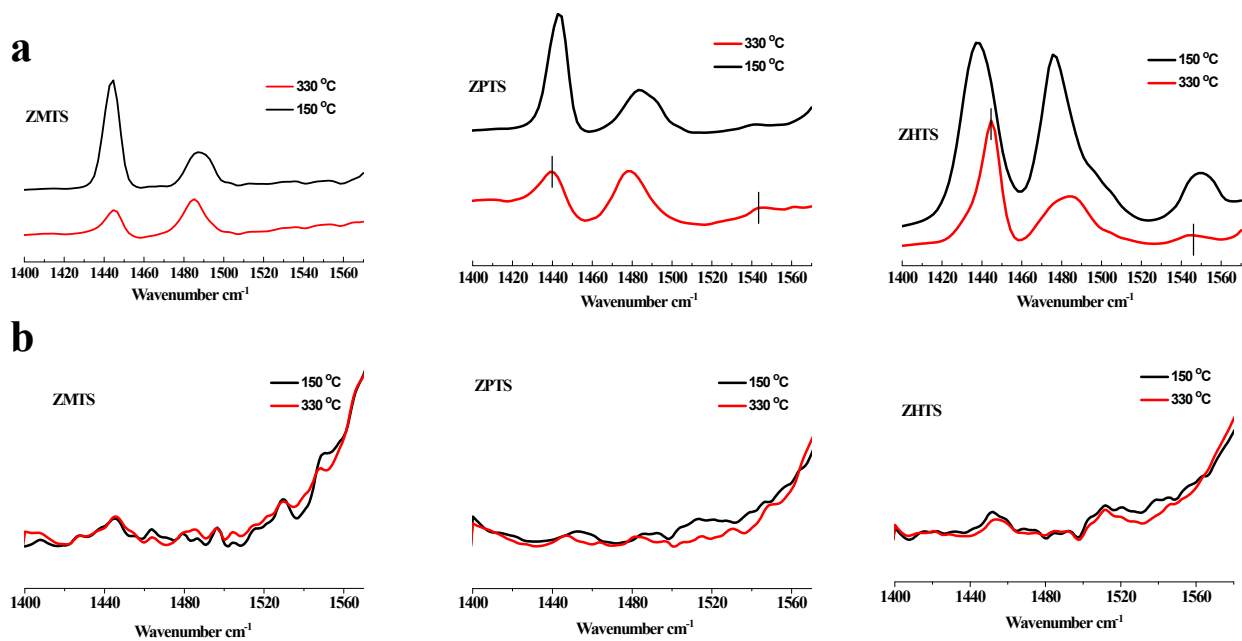


Figure S3. Py-FTIR spectra of ZMIS, ZPTS and ZHTS (a) pyridine and (b) dimethyl pyridine.

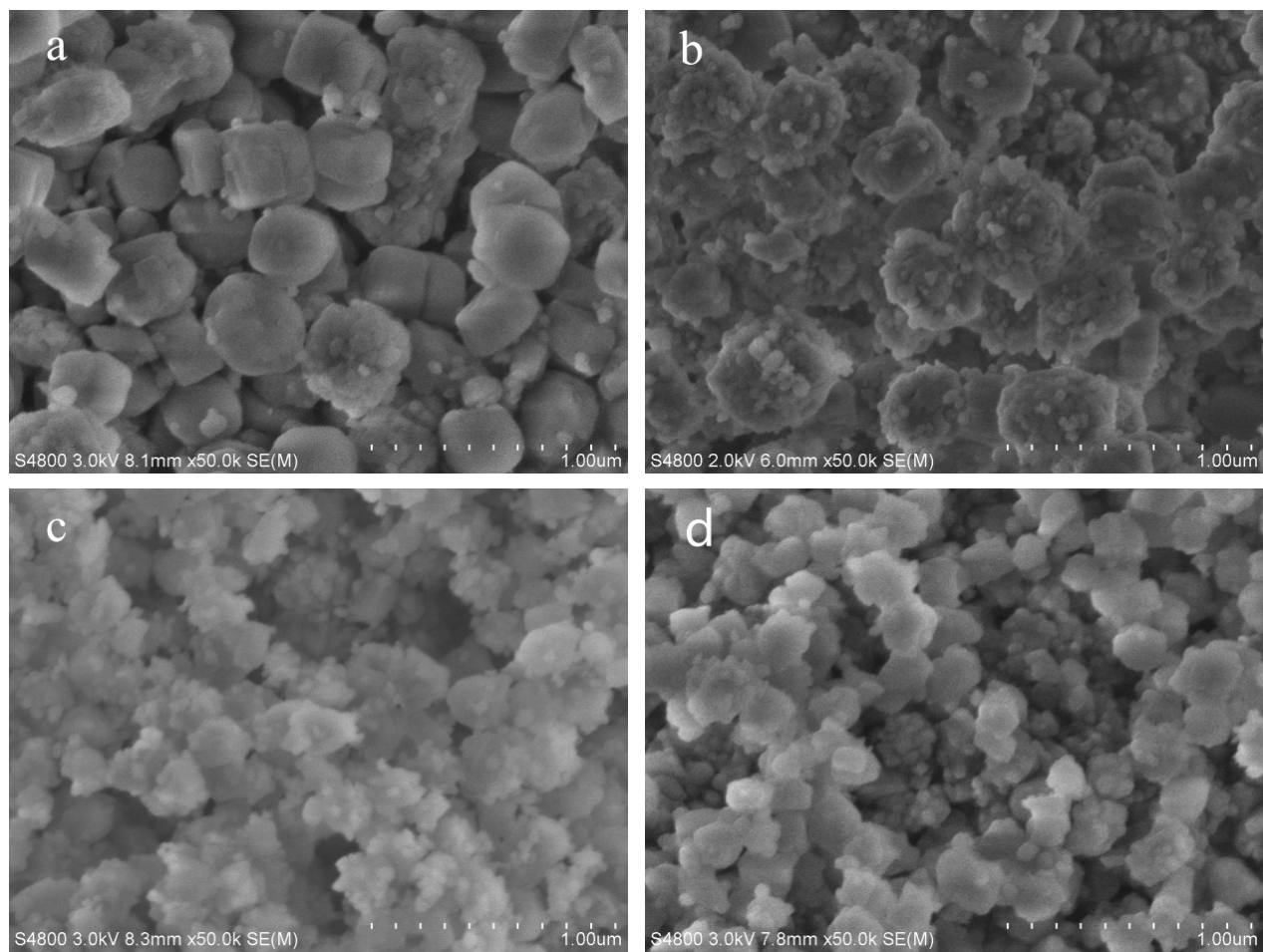


Figure S4. SEM images of hierarchical HZSM-5 zeolites synthesized using [a] trimethoxymethylsilane (MTS); [b] trimethoxy[propyl]silane (PTS); [c] trimethoxy[octyl]silane (OTS), and [d] hexadecyltrimethoxysilane (HTS) under pre-crystallizing for 12 h.

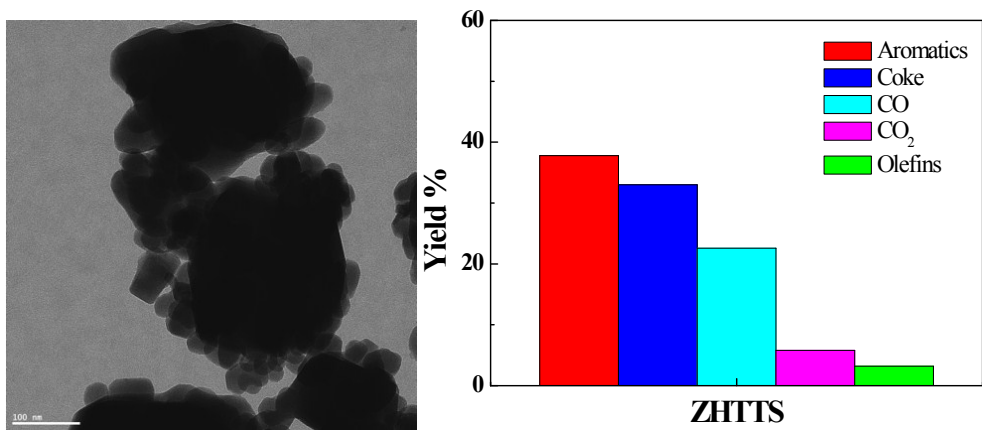


Figure S5. TEM result and CFP of cellulose over hierarchical ZSM-5 prepared by trimethoxyoctadecylsilane (TTS) under pre-crystallizing 12 h. Reaction conditions: 600 °C of reaction temperature and 1: 20 of biomass/catalyst ratio.

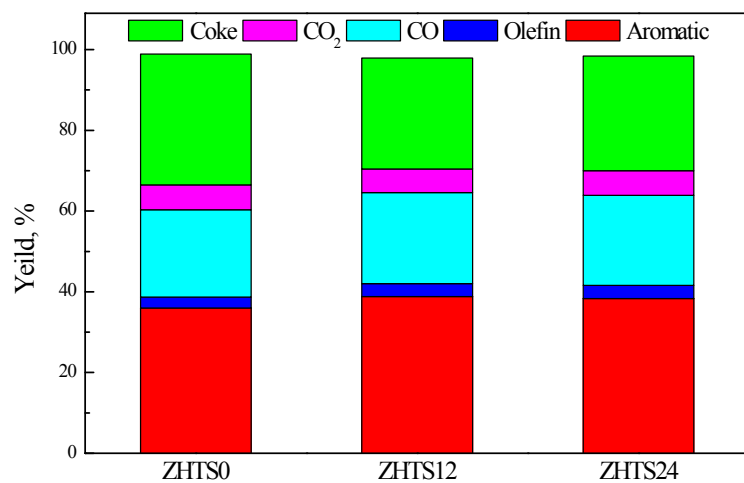


Figure S6. Product distributions in CFP of cellulose over hierarchical ZSM-5 prepared by hexadecyltrimethoxysilane (HTS) under pre-crystallizing 0 h, 12 h and 24 h. Reaction conditions: 600 °C of reaction temperature and 1: 20 of biomass/catalyst ratio.

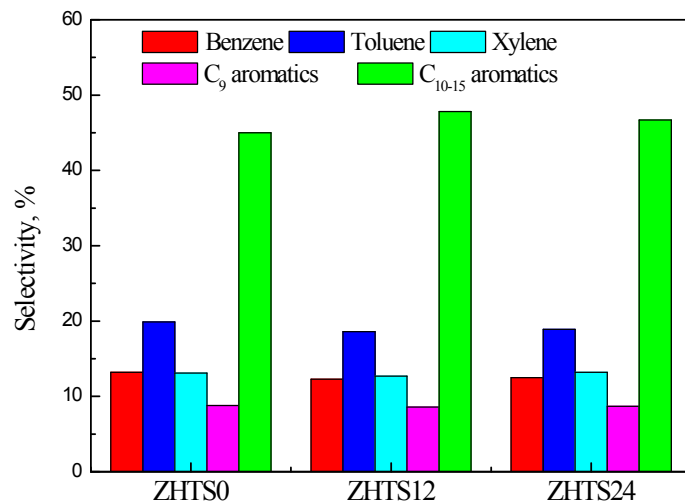


Figure S7. Aromatic distributions in CFP of cellulose over hierarchical ZSM-5 prepared by hexadecyltrimethoxysilane (HTS) under pre-crystallizing 0 h, 12 h and 24 h. Reaction conditions: 600 °C of reaction temperature and 1: 20 of biomass/catalyst ratio.