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Synergistic effect of metal oxidation states and surface acidity enhanced the trace ethylene adsorption of Ag/ZSM-5

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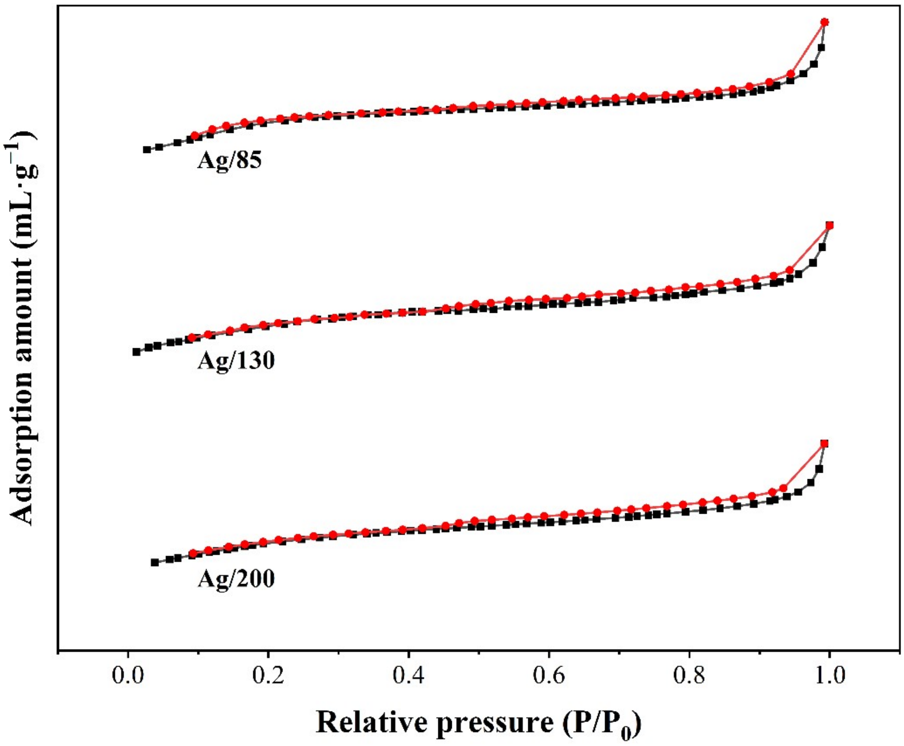

Fig. S1. The N_2 adsorption-desorption isotherms of Ag/ZSM-5(85), Ag/ZSM-5(130) and Ag/ZSM-5(200).

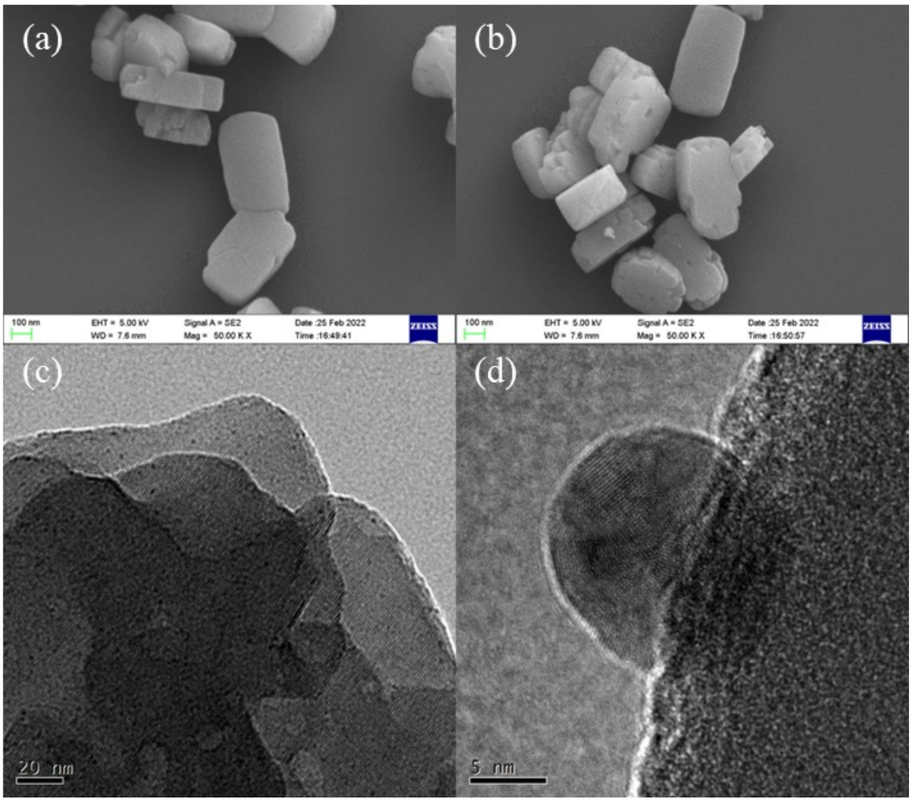

Fig. S2. (a), (b) The SEM images of Ag/ZSM-5(130); (c), (d) The TEM images of Ag/ZSM-5(130).

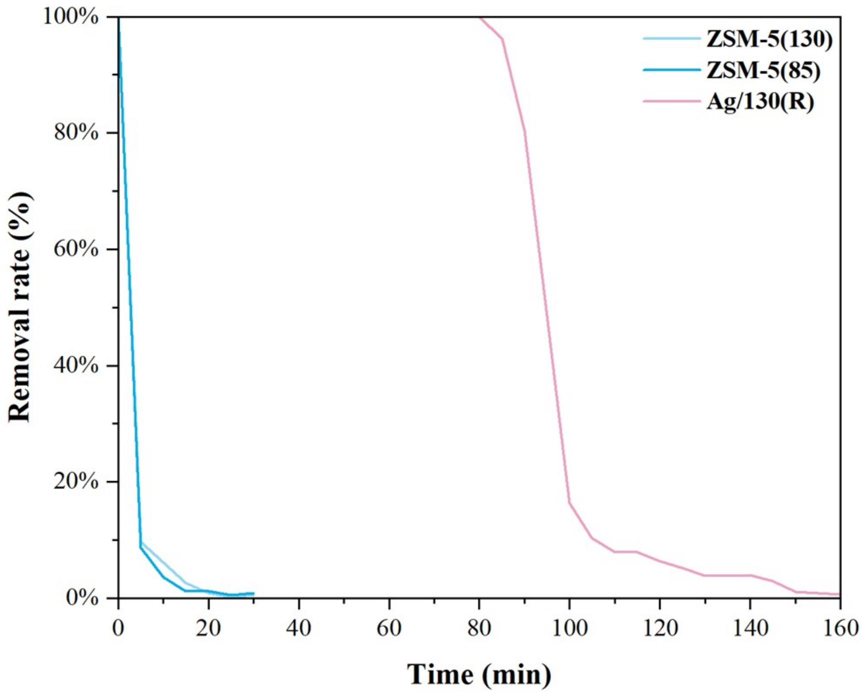

Fig. S3. The breakthrough curves of pristine ZSM-5(130), ZSM-5(85), and reduced Ag/ZSM-5(130) at the experiment conditions.

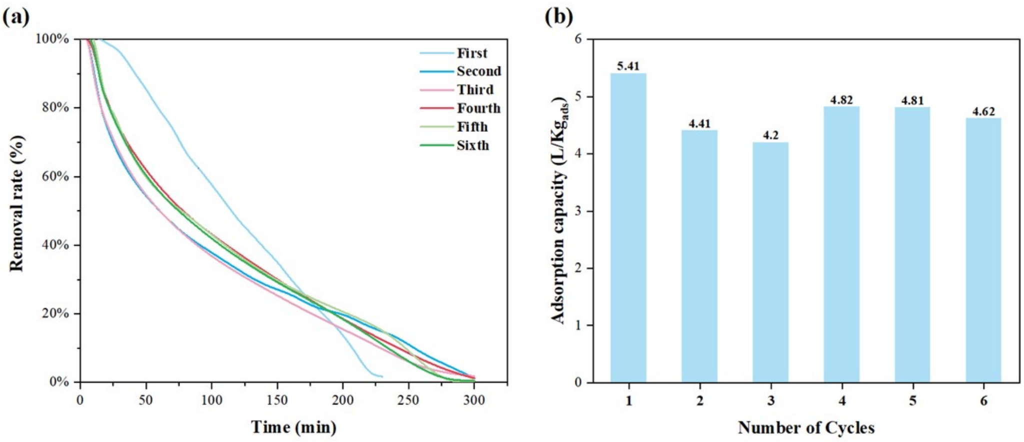

Fig. S4. (a) The breakthrough curves of Ag/ZSM-5(130) with six consecutive cycles; (b) The adsorption capacity of Ag/ZSM-5(130) with six consecutive cycles.

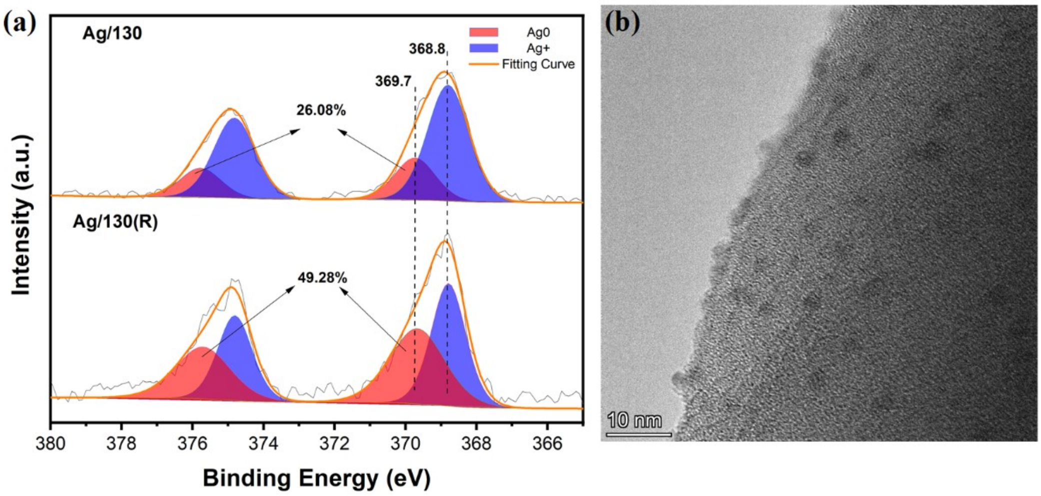

Fig. S5. (a) High-resolution XPS spectra of Ag/ZSM-5(130) and reduced Ag/ZSM-5(130); (b) The TEM image of reduce Ag/ZSM-5(130).

Table S1.

Structural parameters of the adsorbents.

Adsorbent	S_{total}[a] (m^2g^{-1})	V_{total}[b] (cm^3g^{-1})	V_{micro}[c] (cm^3g^{-1})	D[d] (nm)	Ag[e] (%)
Ag/ZSM-5(38)	304.98	0.205	0.163	0.731	-
Ag/ZSM-5(85)	370.84	0.247	0.174	0.758	0.504
Ag/ZSM-5(130)	361.31	0.248	0.178	0.639	0.495
Ag/ZSM-5(200)	362.30	0.227	0.173	0.773	0.498
Ag/ZSM-5(300)	358.37	0.208	0.166	0.652	-
ZSM-5-130	351.40	0.237	0.177	0.809	-

[a] Specific surface area obtained from BET equation (P/P_0 = 0.04-0.32).

[b] Total pore volume calculated by NLDFT methods.

[c] NLDFT micropore volume.

[d] Average pore size obtained by using the HK method.

[e] Silver loaded content determined by ICP-OES.