Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Efficient Cu catalyst for 5-hydroxymethylfurfural hydrogenolysis by forming Cu-O-Si bond

Yifeng Zhu,[a] Xiao Kong,[b,*] Bo Peng,[c] Luping Li,[b] Zhen Fang[b] and Yulei Zhu[a,d]

[a] State Key Laboratory of Coal Conversion, Institute of Coal Chemistry, Chinese Academy of Sciences, Taiyuan 030001, P. R. China.

[b] College of Engineering, Nanjing Agricultural University, Nanjing 210031, P.R. China.

[c] Sinopec Research Institute of Petroleum Processing, Beijing, 100083, P.R. China.

[d] Synfuels China Company Ltd., Beijing 101407, P. R. China.

[*] To whom correspondence should be addressed. xiaokong@njau.edu.cn

Table S1. Catalytic performance of different Cu based catalysts for HMF conversion to DMF/DMTHF in batch reactor.

Catalysts	HMF amount (g)	Catalyst amount (g)	T (^{o}C)	P (MPa)	t (h)	DMF yield (%)	Ref.
Cu20-PMO	0.5	0.1	220	5	6	66.0	[1]
CuCo®/NGr/α-Al_2O_3	0.126	0.1	180	2	16	99.0	[2]
CuZn-2	1.5	0.5	220	1.5	5	91.8	[3]
NC-Cu/MgAlO	0.5	0.1	220	*in situ* cyclohexanol	0.5	96.1	[4]
Cu-Co@C	0.25	0.02	180	5	8	99.4	[5]
Cu/Al_2O_3	0.1	0.03	240	*in situ* methanol	6	73.9	[6]
Cu/ZnO	0.1	0.03	240	*in situ* methanol	10	76.5	[6]
Cu-Co/Al_2O_3	0.315	0.5	220	3	8	78.0	[7]
Cu-Ni/TiO_2	0.5	0.3	200	2.5	8	84.3	[8]
CuZn alloy	0.5	0.1	220	3	18	97.0	[9]
CuSi-PS	0.75	0.1	180	1.5	2	93.4	This work

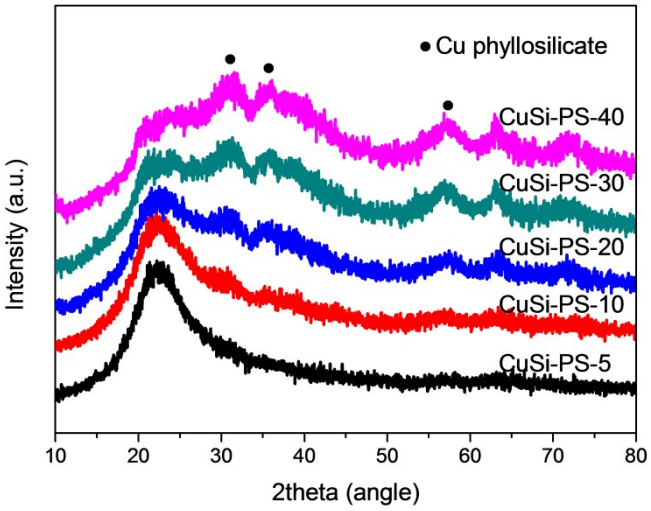

Figure S1. The XRD patterns of dried CuSi-PS-x catalysts.

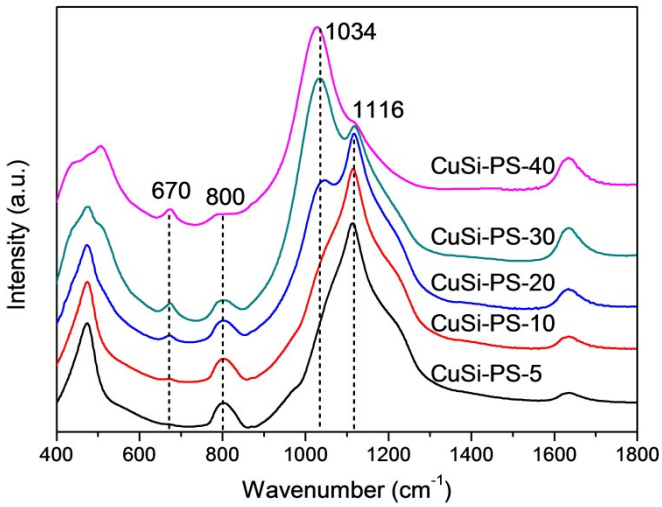

Figure S2. The IR spectra of dried CuSi-PS-x catalysts.

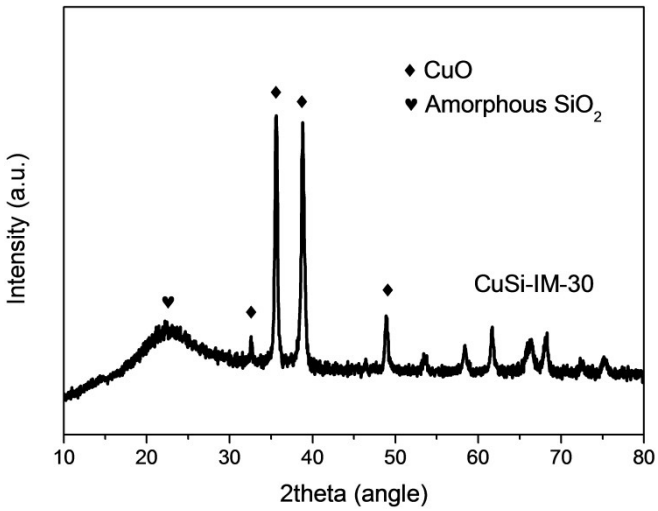

Figure S3. The XRD patterns of calcined CuSi-IM-30 catalyst.

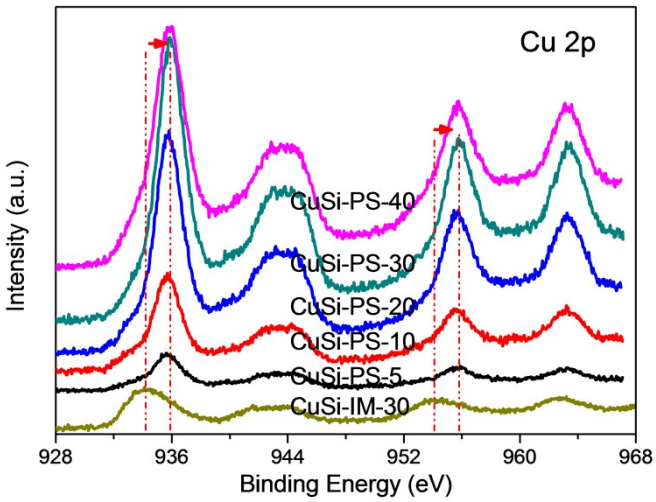

Figure S4. Cu2p spectra of the calcined catalysts.

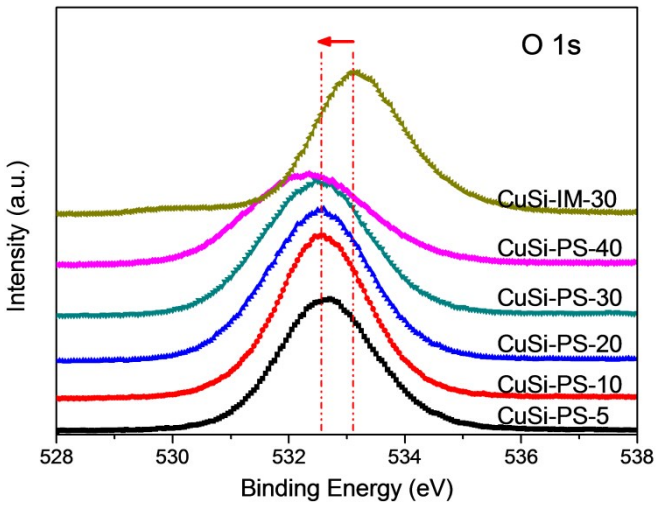

Figure S5. O1s spectra of the calcined catalysts.

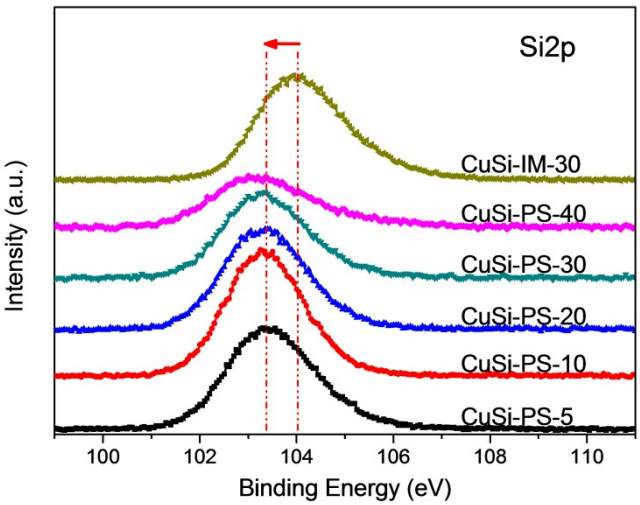

Figure S6. Si2p spectra of the calcined catalysts.

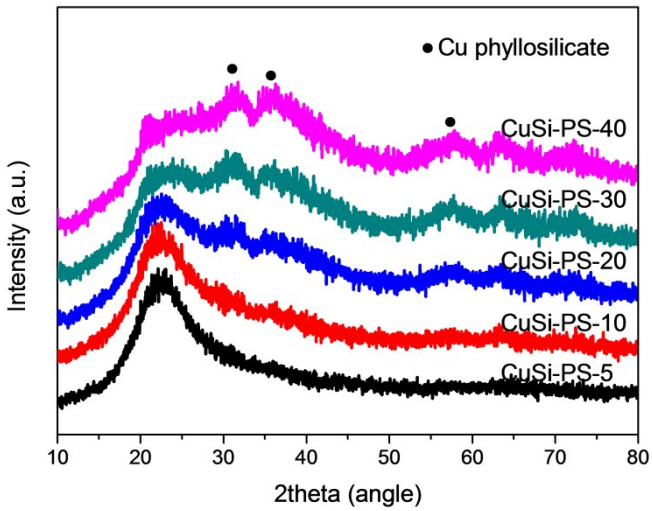

Figure S7. XRD spectra of the calcined CuSi-PS-x catalysts.

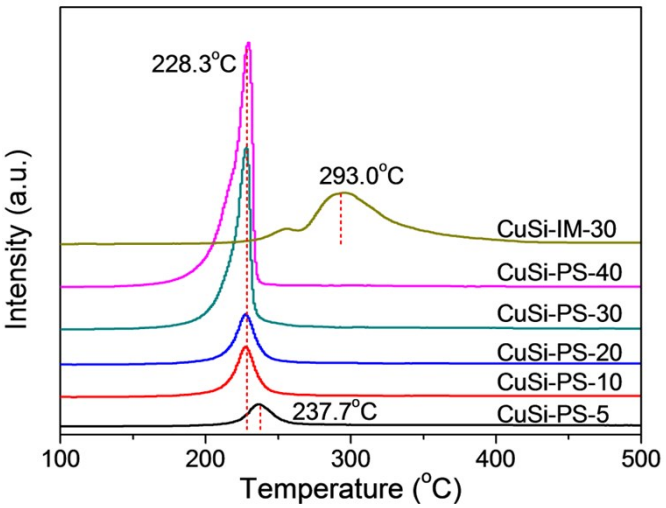

Figure S8 TPR results of calcined catalysts.

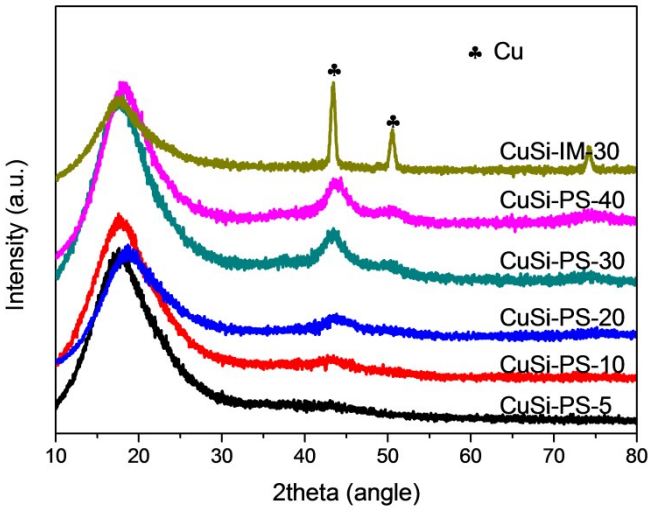

Figure S9. XRD patterns of the reduced catalysts.

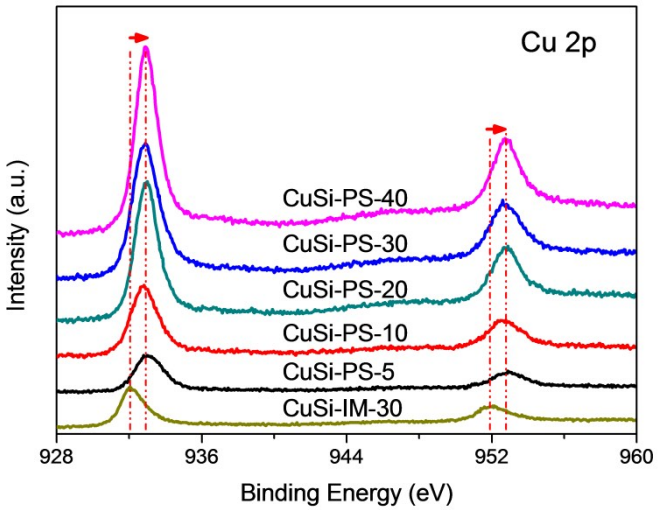

Figure S10. Cu2p spectra of the reduced catalysts.

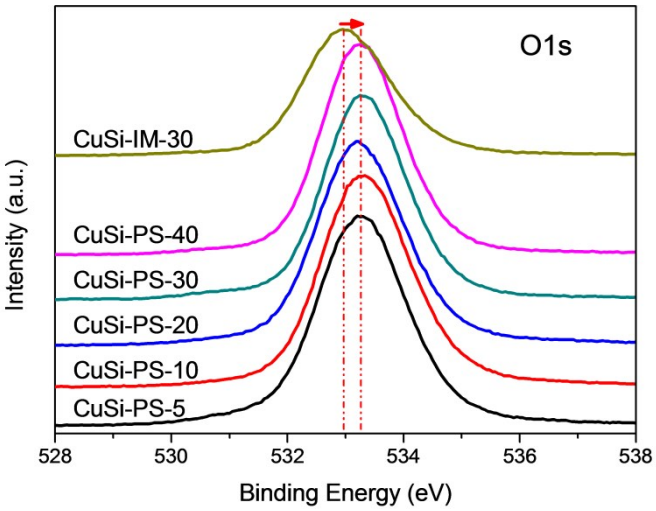

Figure S11. O1s spectra of the reduced catalysts.

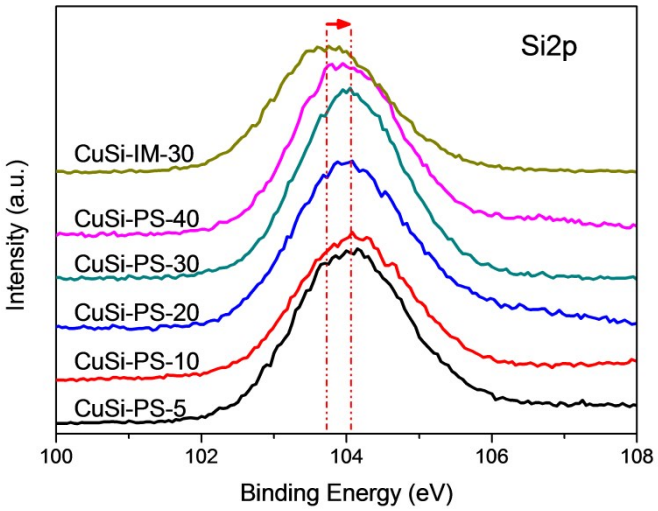

Figure S12. Si2p spectra of the reduced catalysts.

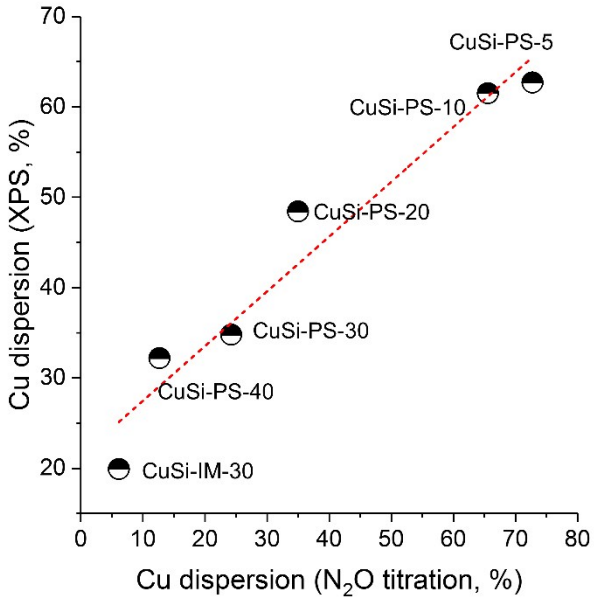

Figure S13. Correlations of Cu dispersion measured by N_2O titration and Cu dispersion measured by XPS results.

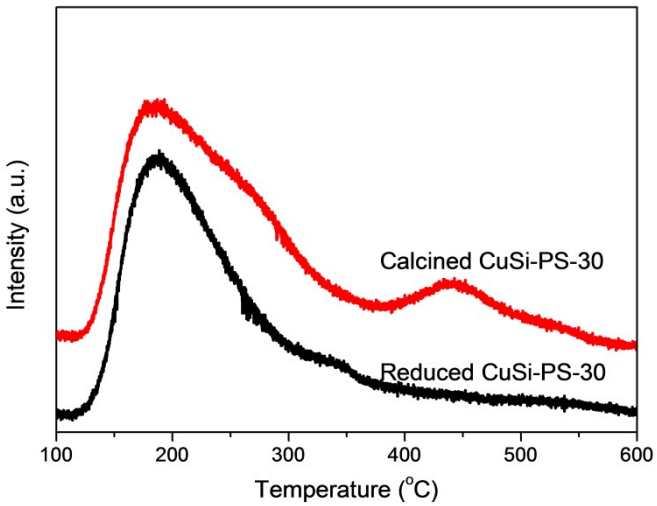

Figure S14. NH_3-TPD results of the calcined and reduced CuSi-PS-30 catalysts.

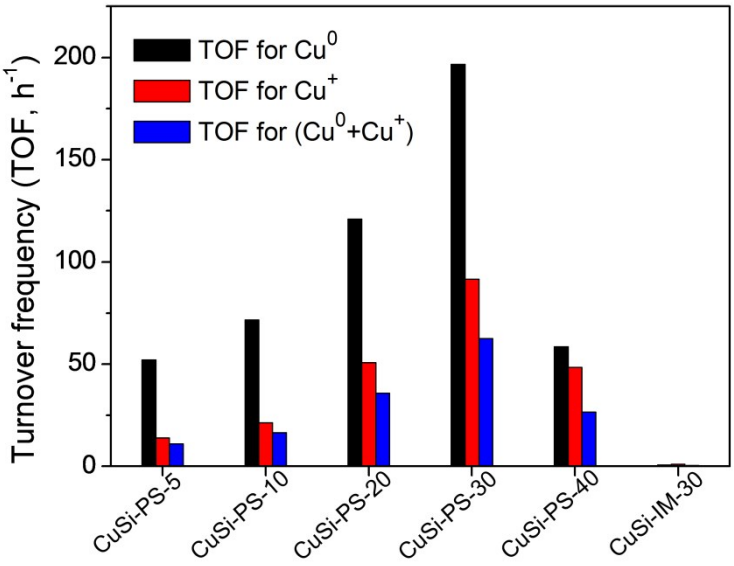

Figure S15 TOF values over different catalysts.

1. A. J. Kumalaputri, G. Bottari, P. M. Erne, H. J. Heeres and K. Barta, *ChemSusChem*, 2014, **7**, 2266-2275.
2. W. Guo, H. Liu, S. Zhang, H. Han, H. Liu, T. Jiang, B. Han and T. Wu, *Green Chemistry*, 2016, **18**, 6222-6228.
3. Y. Zhu, X. Kong, H. Zheng, G. Ding, Y. Zhu and Y.-W. Li, *Catalysis Science & Technology*, 2015, **5**, 4208-4217.
4. Z. Gao, C. Li, G. Fan, L. Yang and F. Li, *Applied Catalysis B: Environmental*, 2018, **226**, 523-533.
5. B. Chen, F. Li, Z. Huang and G. Yuan, *Applied Catalysis B: Environmental*, 2017, **200**, 192-199.
6. Z. Zhang, C. Wang, X. Gou, H. Chen, K. Chen, X. Lu, P. Ouyang and J. Fu, *Applied Catalysis A: General*, 2019, **570**, 245-250.
7. S. Srivastava, G. C. Jadeja and J. Parikh, *Chinese Journal of Catalysis*, 2017, **38**, 699-709.
8. B. Seemala, C. M. Cai, C. E. Wyman and P. Christopher, *ACS Catalysis*, 2017, **7**, 4070-4082.
9. G. Bottari, A. J. Kumalaputri, K. K. Krawczyk, B. L. Feringa, H. J. Heeres and K. Barta, *ChemSusChem*, 2015, **8**, 1323-1327.