Electronic Supplementary Information

Freestanding CuS nanowalls: ionic liquids assisted synthesis and prominent catalytic decomposition performance for ammonium perchlorate

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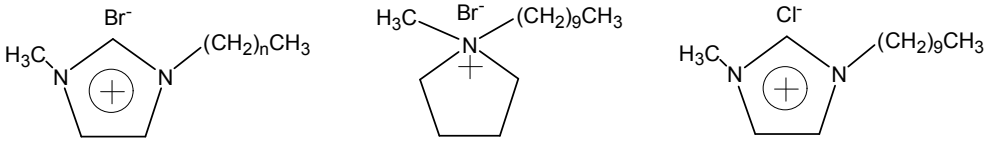

[$C_n$mim]Br
(n = 1, 3, 9, 15)

[C_{10}mpyr]Br

[C_{10}mim]Cl

Fig. S1 Structure and abbreviation of the used ILs.

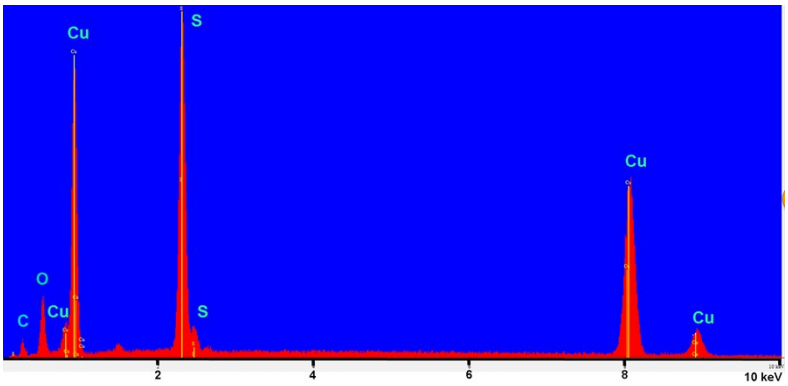

Fig. S2 EDX spectra of the as-prepared CuS nanowalls.

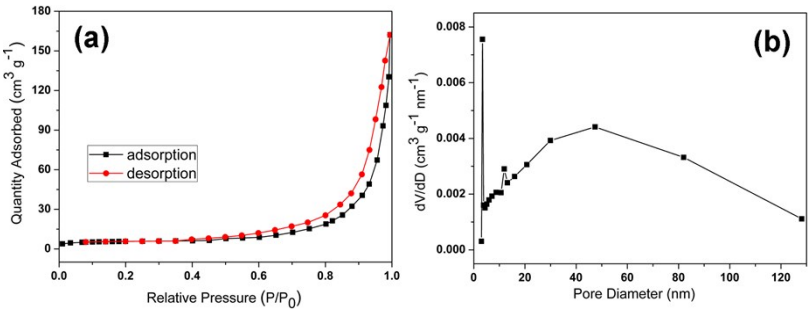

Fig. S3 N_2 adsorption-desorption isotherms (a) and pore size distribution (b) of the as-prepared CuS nanowalls.

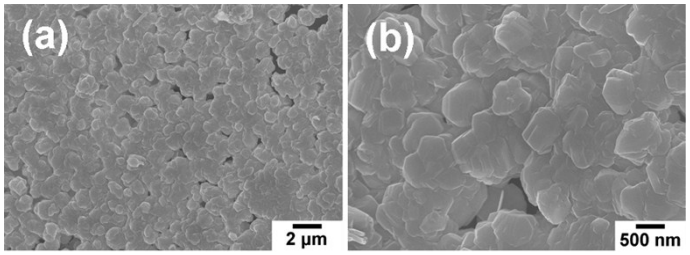

Fig. S4 The differently magnified FESEM images of the CuS samples synthesized at $CHCl_3$-H_2O interface at 150℃ for 10h in the absence of [C_{10}mim]Br.

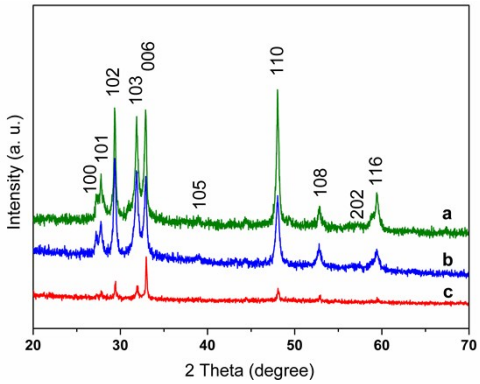

Fig. S5 XRD patterns of the CuS samples synthesized at the $CHCl_3$-H_2O interface at 150℃ for 10h under the modulation of the ILs with different alkyl chain lengths: (a) [C_2mim]Br, (b) [C_4mim]Br, and (c) [C_{16}mim]Br.

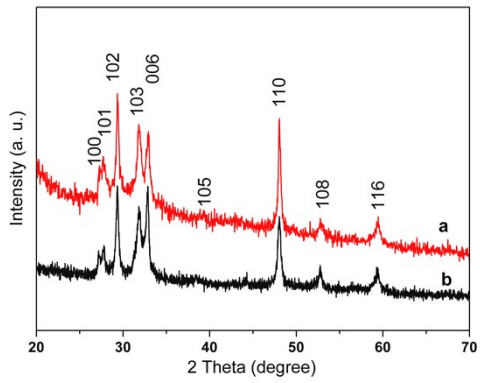

Fig. S6 XRD patterns of the CuS samples synthesized at different ILs-modulated interface of $CHCl_3$-H_2O at 150℃ for 10 h: (a) [C_{10}mpyr]Br and (b) [C_{10}mim]Cl.

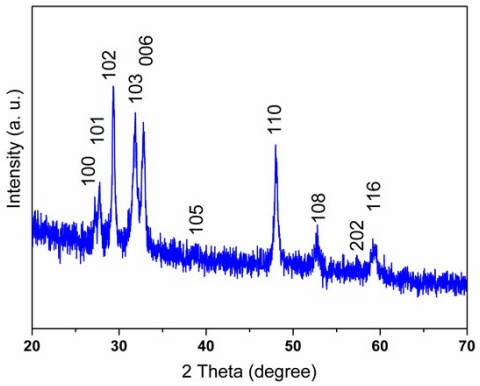

Fig. S7 XRD pattern of the CuS samples synthesized at $CHCl_3$-H_2O interface at 150℃ for 10 h in the absence of [C_{10}mim]Br.

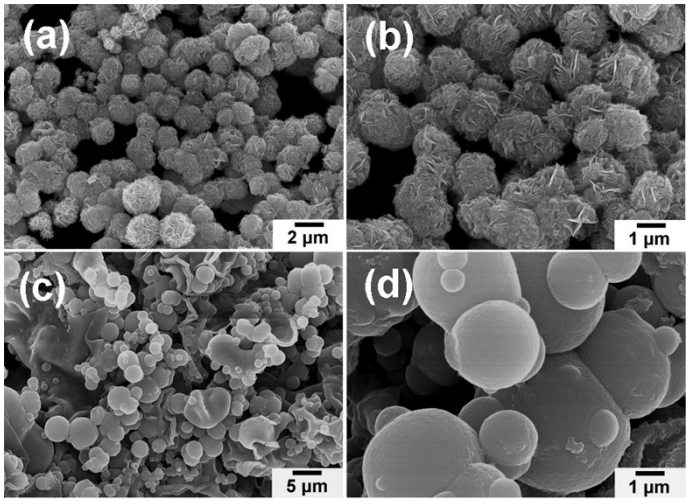

Fig. S8 The magnified FESEM images of the CuS samples synthesized at the [C_{10}mim]Br-modulated interface of $CHCl_3$-H_2O at different temperatures for 10h: (a)-(b), 120℃; and (c)-(d), 180℃.

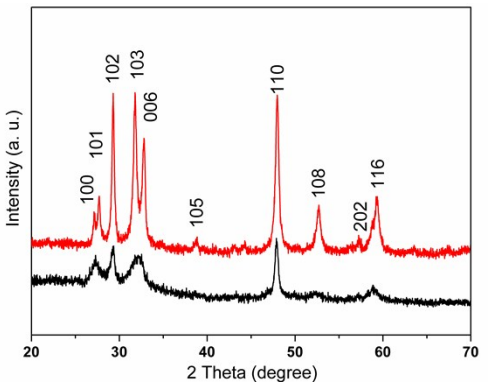

Fig. S9 XRD patterns of the CuS samples synthesized at the $[C_{10}mim]Br$-modulated interface of $CHCl_3$-H_2O at different temperatures for 10 h: (a) 120℃, and (b) 180℃.

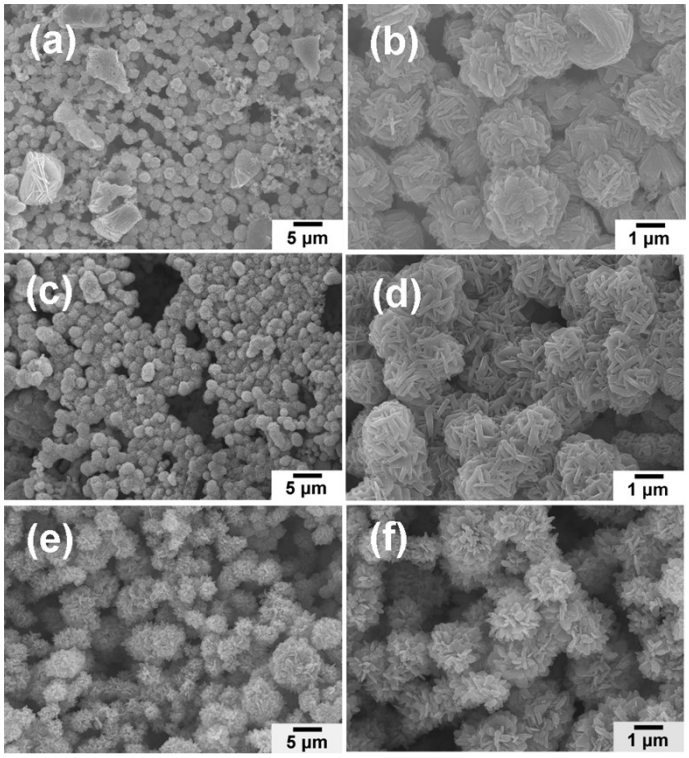

Fig. S10 The magnified FESEM images of the CuS samples synthesized at the $[C_{10}mim]Br$-modulated interface of $CHCl_3$-H_2O at 150℃ for 10 h by using different precursors: (a)-(b), $Cu(C_2H_5OCS_2)_2$; (c)-(d), $Cu(acac)_2$, and (e)-(f), $CuSO_4$.

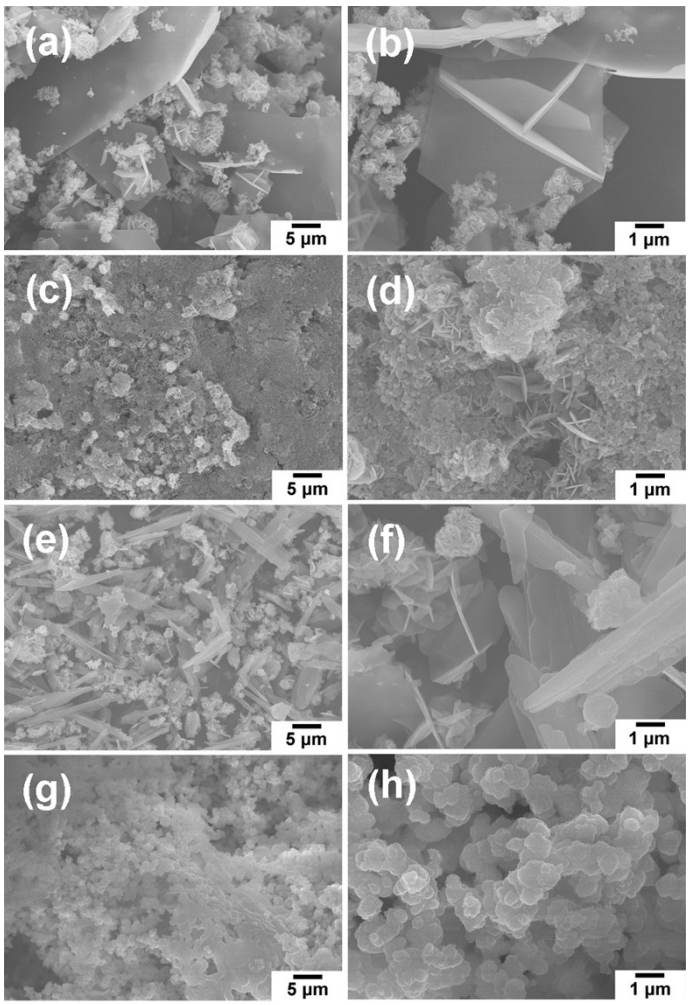

Fig. S11 The magnified FESEM images of the CuS samples synthesized at the $[C_{10}mim]Br$-modulated interface of $CHCl_3$-H_2O at 150℃ for 10h by using different sulfur sources: (a)-(b), TAA; (c)-(d), Na_2S; (e)-(f), $Na_2S_2O_3$; and (g)-(h), NaSCN.

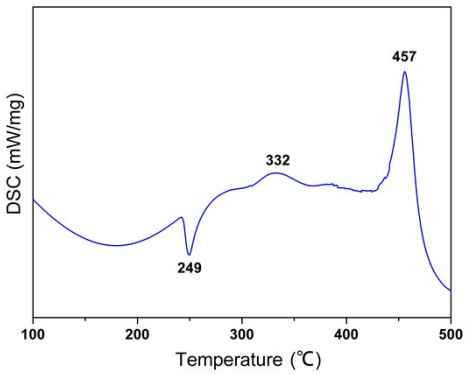

Fig. S12 DSC curve for pure AP.

Table S1 Comparison of the decrease in ending thermal decomposition temperature of AP in the presence of the as-prepared CuS nanowalls with previously reported other catalysts.

Catalyst	**MF[a]**	**Decrease of ETDT[b] (℃)**	**Ref.**
Freestanding CuS nanowalls	2 wt%	123	Present work
Nestlike CuS hollow spheres	2 wt%	30	[S1]
Flowerlike CuS nanostructures	2 wt%	104	[S2]
$Cu(OH)_2$ shell	2 wt%	81	[S3]
Facet-Controlled Co_3O_4 structures	2 wt%	120	[S4]
Co_3O_4 flowerlike architectures	2 wt%	94	[S5]
Co_3O_4 multilayer stacked structures	2 wt%	93	[S5]
Co_3O_4 nanosheets	2 wt%	101	[S5]
Sn_3Cu intermetallics	2 wt%	89	[S6]
Sn_6Cu_5 intermetallics	2 wt%	39	[S6]
Nano Cu β-resorcylate	2 wt%	94	[S7]
NiO nanoflowers	4 wt%	73	[S8]
NiO nanorods	4 wt%	52	[S8]
ZnO nanoparticles	4 wt%	107	[S9]
Co_3O_4 nanoparticles	4 wt%	98	[S9]
Fe_2O_3 nanoparticles	4 wt%	62	[S9]
Co particles	4 wt%	85	[S10]

[a] MF is the mass fraction of CuS in the mixtures, [b] ETDT is the ending thermal decomposition temperature.

References

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