

Supporting Information

Optimizing leaching parameters and studying kinetics of copper recovering from waste printed circuit boards

Juanjuan Hao¹, Xiaolu Wang¹, Yishu Wang¹, Yufeng Wu¹, Fu Guo^{1, 2, *}

1. --- Faculty of Materials and Manufacturing, Beijing University of Technology, Beijing 100124, P. R. China

2. --- Key Laboratory of Advanced Functional Materials, Ministry of Education, Beijing 100124, P. R. China

* Corresponding author Email: guofu@bjut.edu.cn

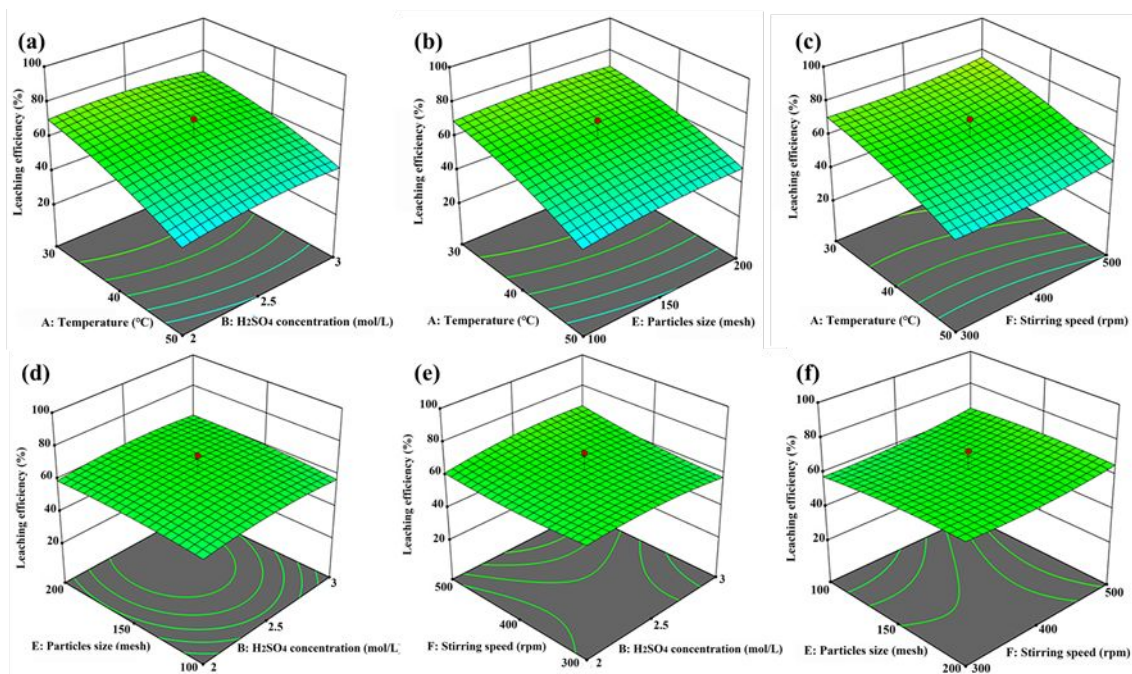


Figure S1. Response surface plots reflecting the simultaneous effects of dual parameters on the leaching efficiency of copper. (a) temperature and $[\text{H}_2\text{SO}_4]$, (b) temperature and particles size, (c) temperature and stirring speed, (d) $[\text{H}_2\text{SO}_4]$ and particles size, (e) $[\text{H}_2\text{SO}_4]$ and stirring speed, and (f) particles size and stirring speed.

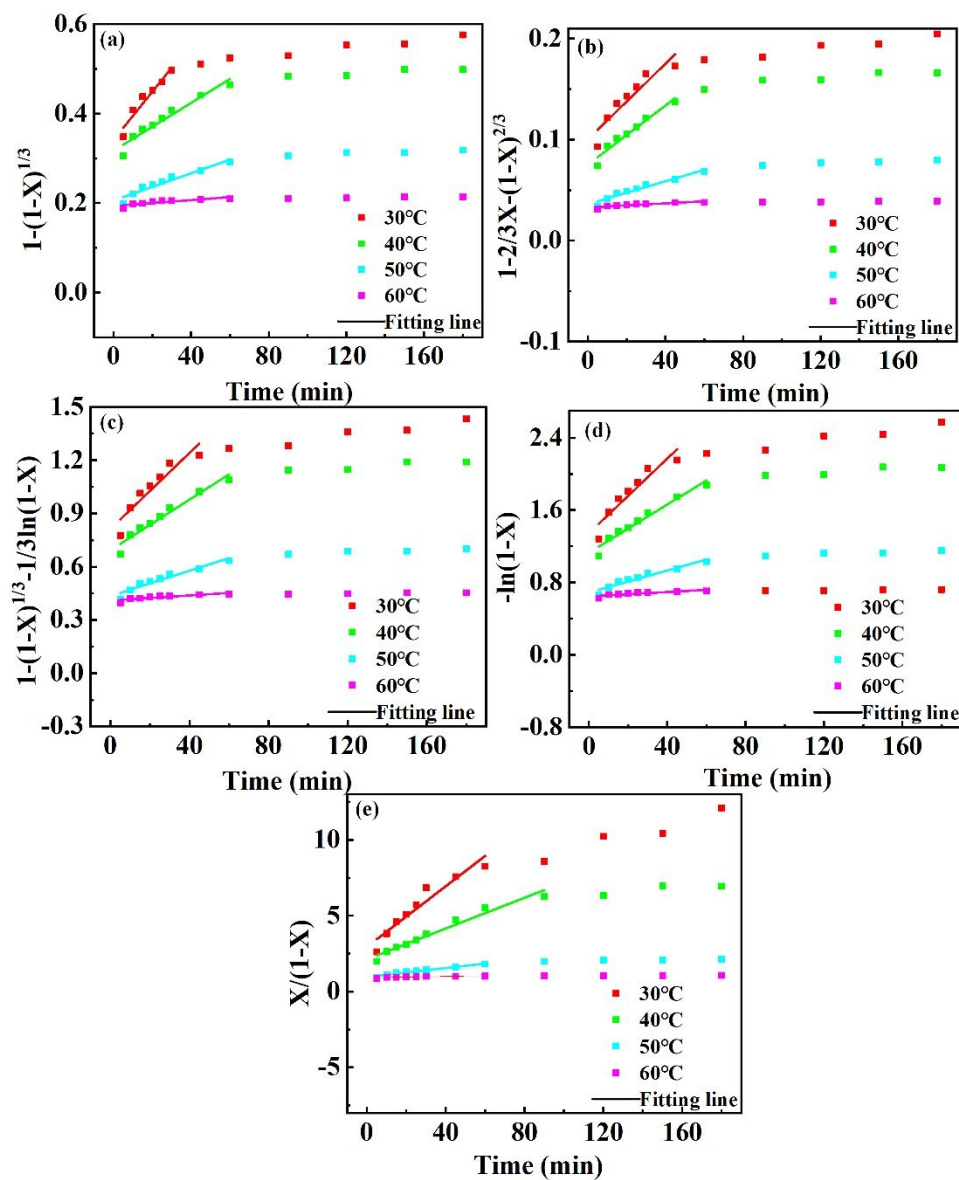


Figure S2. The relationship (a) between $1-(1-X)^{1/3}$ and t, (b) between $1-2/3X-(1-X)^{2/3}$ and t, (c) between $1-(1-X)^{1/3}-1/3\ln(1-X)$ and t, (d) between $-\ln(1-X)$ and t, and (e) between $X/(1-X)$ and t.

Table S1. Fitting results of kinetic equations.

T/K	Chemical control reaction		Diffusion control reaction		Mixed control reaction	
	$1-(1-X)^{1/3}=k_1t$		$1-2/3X-(1-X)^{2/3}=k_2t$		$1-(1-X)^{1/3}-1/3\ln(1-X)$	
	R ²	k	R ²	k/10 ³	R ²	k
303	0.933	0.0054	0.862	0.00187	0.872	0.011
313	0.94	0.0027	0.951	0.00146	0.952	0.00711
323	0.926	0.0015	0.946	5.68*10 ⁻⁴	0.932	0.00355
333	0.726	3.26*10 ⁻⁴	0.737	1.046*10 ⁻⁴	0.728	7.34*10 ⁻⁴
T/K	First order pseudo		Second order pseudo			
	$-\ln(1-X)$		$X/(1-X)$			
	R ²	k	R ²	k		
303	0.881	0.021	0.90	0.0999		
313	0.958	0.0133	0.957	0.051		
328	0.936	0.0061	0.95	0.01449		
333	0.73	0.00122	0.74	0.0024		