Mechanism of ultrasonic enhanced alkaline selective leaching of zinc from steel waste: Experimental and DFT simulation analysis

Chunfu Xin [a,b], Shenxu Bao [a,b,c*], Yimin Zhang [b,d], Bo Chen [a,b,c], Wei Ding [b], Hongwei Zhang [b], Shuo Liu [a,b,c]

[a] *Key Laboratory of Green Utilization of Critical Non-metallic Mineral Resources, Ministry of Education, Wuhan University of Technology, Wuhan 430070, PR China*

[b] *School of Resources and Environmental Engineering, Wuhan University of Technology, Wuhan 430070, PR China*

[c] *Hubei Key Laboratory of Processing of Mineral Resources and Environment, Wuhan University of Technology, Wuhan 430070, PR China*

[d] *State Environmental Protection Key Laboratory of Mineral Metallurgical Resources Utilization and Pollution Control, Wuhan University of Science and Technology, Wuhan 430081, PR China*

Corresponding author: Shenxu Bao, E-mail: sxbao@whut.edu.cn

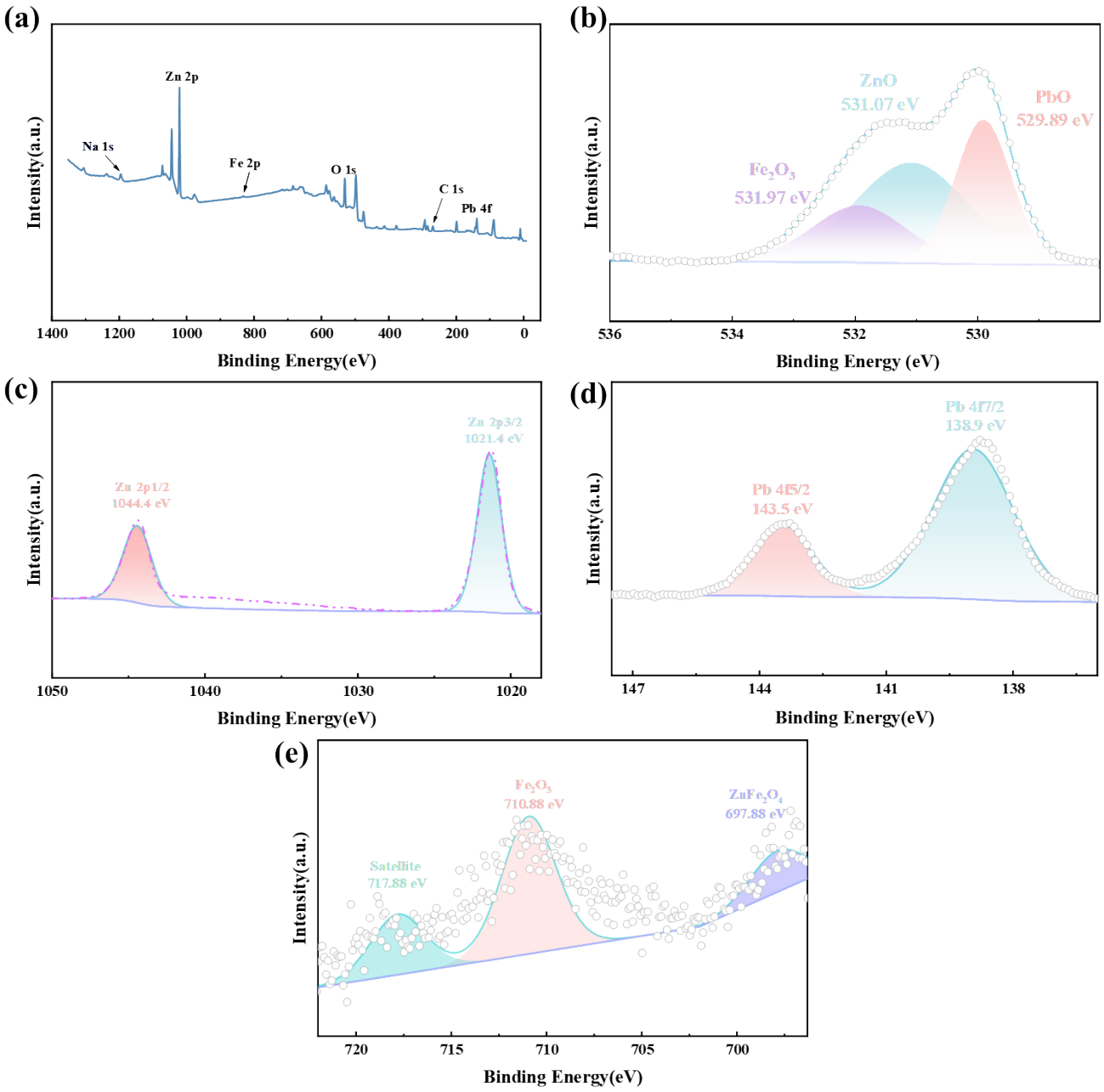
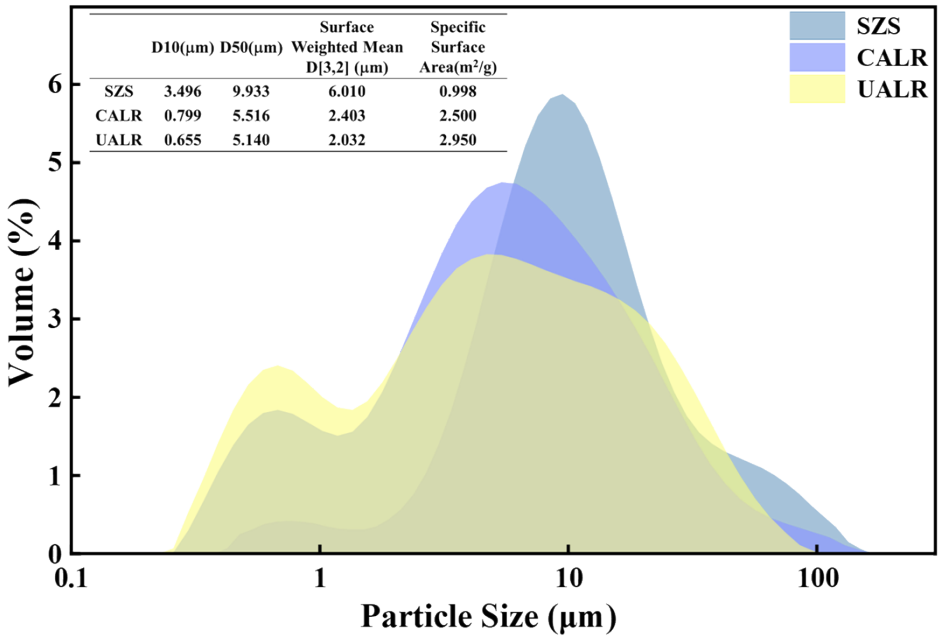


Fig. S1. XPS spectra of SZS: (a) Total spectrum; (b) O 1s; (c) Zn 2p; (d) Pb 4f; (e) Fe 2p.



	D10(μm)	D50(μm)	Surface Weighted Mean D[3,2] (μm)	Specific Surface Area(m^2/g)
SZS	3.496	9.933	6.010	0.998
CALR	0.799	5.516	2.403	2.500
UALR	0.655	5.140	2.032	2.950

Fig. S2. Particle Size Distribution: (a) SZS; (b) CALR; (c) UALR.

Table S1 Model fitting correlation analysis of Zn leaching kinetics.

Process Type	Temperature (℃)	Correlation coefficients(R^2)		
		$1-(1-x)^{1/3}$	$1-(2/3)x-(1-x)^{2/3}$	$(1/3)\ln(1-x)-[1-(1-x)^{(-1/3)}]$
UAL	30	0.99674	0.99661	0.97928
	40	0.99474	0.99544	0.95781
	50	0.98516	0.98994	0.91200
	60	0.96629	0.98661	0.78804
CAL	30	0.99179	0.99362	0.99889
	40	0.98763	0.98999	0.99759
	50	0.98551	0.98748	0.99750
	60	0.98846	0.98981	0.99913