Sustainable leaching of mixed LIBs waste cathode employing a Deep Eutectic Solvent composed of L-Proline and Lactic Acid

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Table S1 Statistical significance of model terms in governing Li, Co, Ni, Fe and Mn leaching efficiency, as evaluated through ANOVA using the quadratic polynomial model in RSM-CCD optimization .

Source	Sum of Squares	Mean Square	F-value	p-value	
Li					
Model	7798.24	866.47	34.74	< 0.0001	Significant
A-Time	197.94	197.94	7.94	0.0183	
B-Temperature	6878.76	6878.76	275.78	< 0.0001	
C-Stirring speed	240.69	240.69	9.65	0.0111	
AB	0.4186	0.4186	0.0168	0.8995	
AC	0.1275	0.1275	0.0051	0.9444	
BC	0.4371	0.4371	0.0175	0.8973	
A^2	23.98	23.98	0.9616	0.3499	
B^2	469.78	469.78	18.83	0.0015	
C^2	15.66	15.66	0.6280	0.4465	
Lack of Fit	157.39	31.48	1.71	0.2851	Not significant
Co					
Model	7112.23	790.25	30.39	< 0.0001	Significant
A-Time	169.64	169.64	6.52	0.0287	
B-Temperature	6449.32	6449.32	248.05	< 0.0001	
C-Stirring speed	190.69	190.69	7.33	0.0220	
AB	0.0028	0.0028	0.0001	0.9919	
AC	0.0000	0.0000	4.808E-07	0.9995	
BC	0.3240	0.3240	0.0125	0.9133	
A^2	4.37	4.37	0.1683	0.6903	
B^2	301.33	301.33	11.59	0.0067	

C²	0.7690	0.7690	0.0296	0.8669	
Lack of Fit	145.72	29.14	1.28	0.3981	Not significant

Ni

Model	7289.68	809.96	43.11	< 0.0001	Significant
A-Time	202.39	202.39	10.77	0.0083	
B-Temperature	6390.50	6390.50	340.14	< 0.0001	
C- Stirring speed	217.92	217.92	11.60	0.0067	
AB	4.65	4.65	0.2476	0.6295	
AC	5.71	5.71	0.3040	0.5935	
BC	2.51	2.51	0.1335	0.7224	
A²	30.95	30.95	1.65	0.2283	
B²	449.13	449.13	23.91	0.0006	
C²	21.01	21.01	1.12	0.3152	
Lack of Fit	112.04	22.41	1.48	0.3394	not significant

Fe

Model	7448.06	827.56	83.32	< 0.0001	significant
A-Time	140.97	140.97	14.19	0.0037	
B-Temperature	6363.15	6363.15	640.64	< 0.0001	
C- Stirring speed	210.76	210.76	21.22	0.0010	
AB	0.8001	0.8001	0.0806	0.7823	
AC	0.5565	0.5565	0.0560	0.8177	
BC	1.19	1.19	0.1202	0.7360	
A²	53.20	53.20	5.36	0.0432	
B²	708.32	708.32	71.31	< 0.0001	
C²	13.92	13.92	1.40	0.2639	
Lack of Fit	39.53	7.91	0.6610	0.6696	not significant

Mn

Model	2082.36	231.37	18.31	< 0.0001	significant
A-Time	24.09	24.09	1.91	0.1974	
B-Temperature	1873.43	1873.43	148.26	< 0.0001	

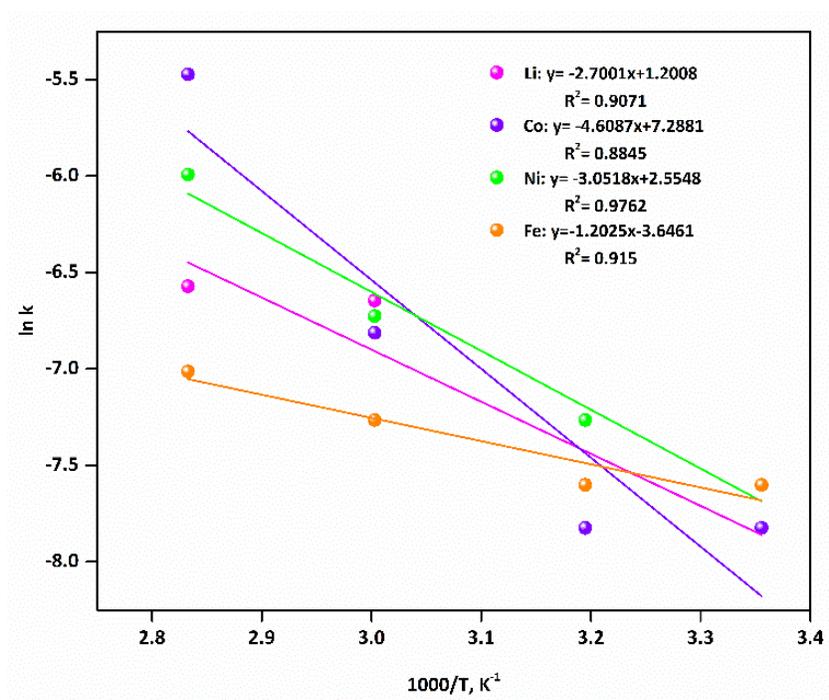|					
C- Stirring speed	81.03	81.03	6.41	0.0298	
AB	8.32	8.32	0.6587	0.4359	
AC	11.38	11.38	0.9003	0.3651	
BC	5.68	5.68	0.4494	0.5178	
A^2	24.98	24.98	1.98	0.1900	
B^2	43.18	43.18	3.42	0.0943	
C^2	2.48	2.48	0.1965	0.6670	
Lack of Fit	49.87	9.97	0.6519	0.6749	not significant

Fig.S1 Arrhenius plot for the leaching of Li, Co, Ni and Fe using Pro: LA+ 30% H_2O DES.