

Electronic Supplementary Information

**Valorization of Ethylene Carbonate Recovered from Spent
Lithium-Ion Battery Electrolytes: Synthesis and Properties
of Biodegradable Poly Ethylene Succinate-co-ethylene
Glycol (PESG) Copolyesters**

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General Information

The supporting information includes three pages and two tables.

Data Availability Summary

Table S1: Design and test results of Box-Behnken.

Tables S2: Variance analysis of regression model.

Table S1. Design and test results of Box-Behnken

Test number	Factor				Intrinsic viscosity [η] (dL·g ⁻¹)
	Catalyst dosage (A) (wt%)	Esterification temperature (B) (°C)	Condensation temperature (C) (°C)	Condensation time (D) (h)	
1	0.8	220	215	2.3	0.52
2	1.2	220	215	2.3	0.43
3	0.8	230	215	2.3	0.47
4	1.2	230	215	2.3	0.45
5	1	225	210	2.1	0.46
6	1	225	220	2.1	0.50
7	1	225	210	2.5	0.40
8	1	225	220	2.5	0.43
9	0.8	225	215	2.1	0.46
10	1.2	225	215	2.1	0.44
11	0.8	225	215	2.5	0.43
12	1.2	225	215	2.5	0.42
13	1	220	210	2.3	0.46
14	1	230	210	2.3	0.39
15	1	220	220	2.3	0.47
16	1	230	220	2.3	0.51
17	0.8	225	210	2.3	0.41
18	1.2	225	210	2.3	0.44
19	0.8	225	220	2.3	0.49
20	1.2	225	220	2.3	0.40
21	1	220	215	2.1	0.45
22	1	230	215	2.1	0.45
23	1	220	215	2.5	0.44
24	1	230	215	2.5	0.42
25	1	225	215	2.3	0.57
26	1	225	215	2.3	0.56
27	1	225	215	2.3	0.57

Table S2. Variance analysis of regression model

Type	Sum of squares of deviations	Degree of freedom	Mean square	F-value	p-value	
Model	0.0602	14	0.0043	10.83	< 0.0001	Significant
A	0.0033	1	0.0033	8.39	0.0134	
B	0.0005	1	0.0005	1.34	0.2691	
C	0.0048	1	0.0048	12.08	0.0046	
D	0.0040	1	0.0040	10.15	0.0078	
AB	0.0012	1	0.0012	3.08	0.1045	
AC	0.0036	1	0.0036	9.06	0.0109	
AD	0.0000	1	0.0000	0.0629	0.8062	
BC	0.0030	1	0.0030	7.62	0.0173	
BD	0.0001	1	0.0001	0.2517	0.6249	
CD	0.0000	1	0.0000	0.0629	0.8062	
A ²	0.0197	1	0.0197	49.69	<0.0001	
B ²	0.0125	1	0.0125	31.37	0.0001	
C ²	0.0197	1	0.0197	49.69	<0.0001	
D ²	0.0249	1	0.0249	62.69	<0.0001	
Residual	0.0048	12	0.0004			
Lost item	0.0047	10	0.0005	14.10	0.0680	Quiet
Pure error	0.0001	2	0.0000			
Total	0.0650	26				
R ² =0.9266			Adjusted R ² =0.8411			