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Supporting Information for

Perspective: Ion Transport Mechanisms and the Significance of Glass Transition Temperature in PEO-based Polymer Blend Electrolytes for Next-Generation Li-Batteries

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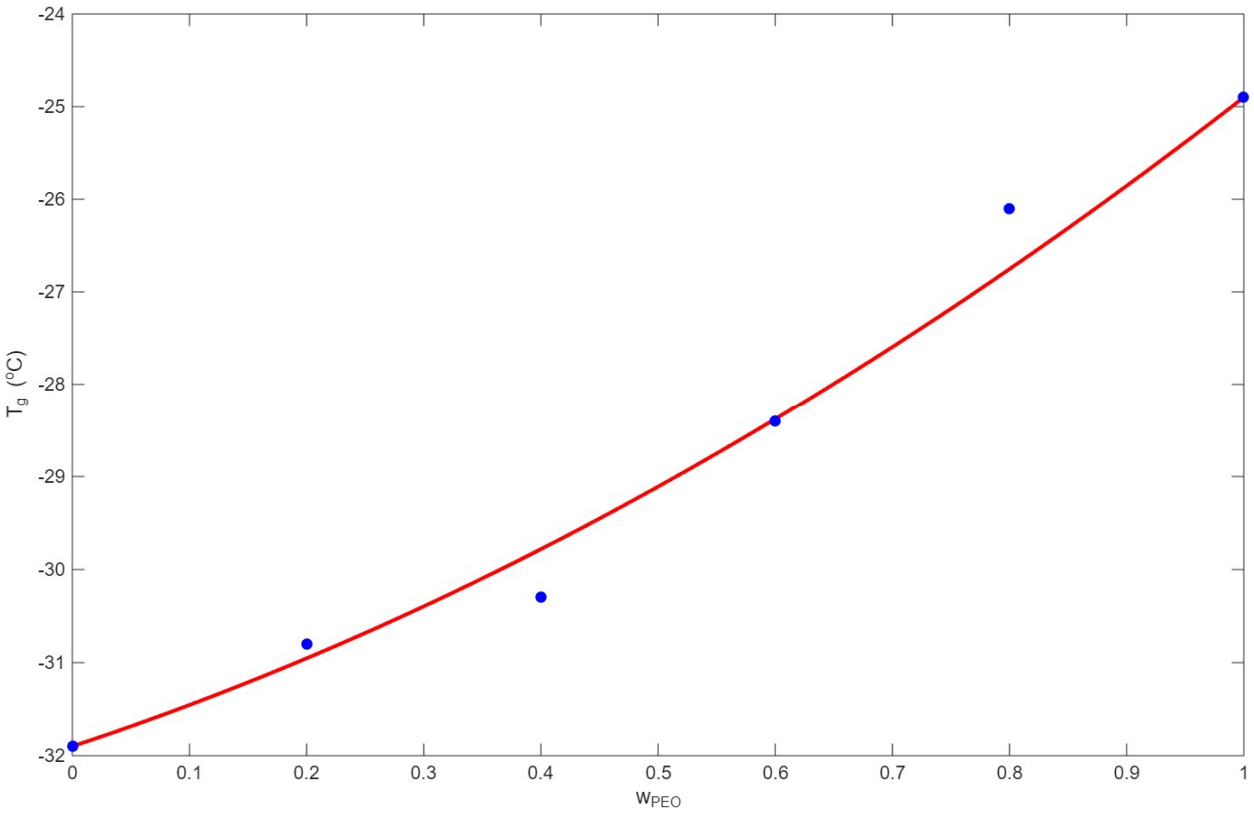
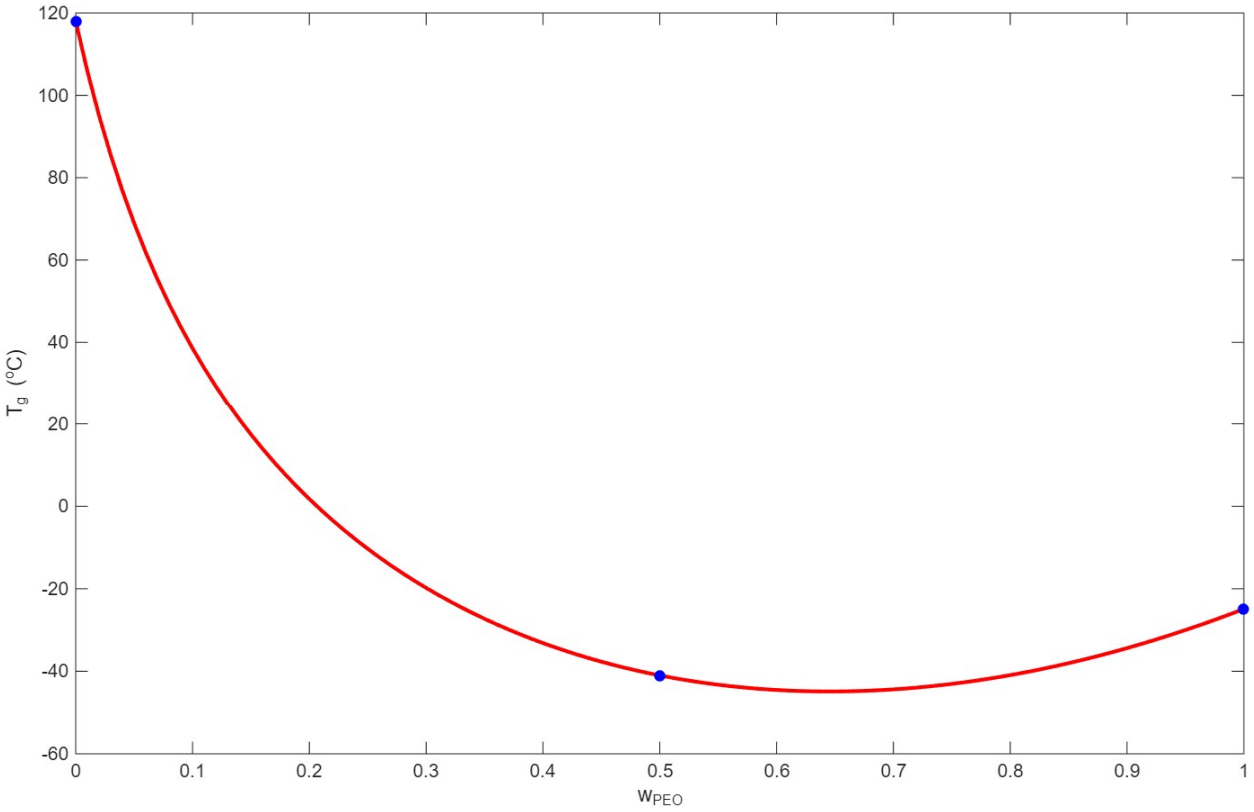


Figure S1. T_g data for PEO/PES/$LiClO_4$ blends at r = 0.1 in blue dots and Kwei fit in red using T_g data from Kim et al.[1]



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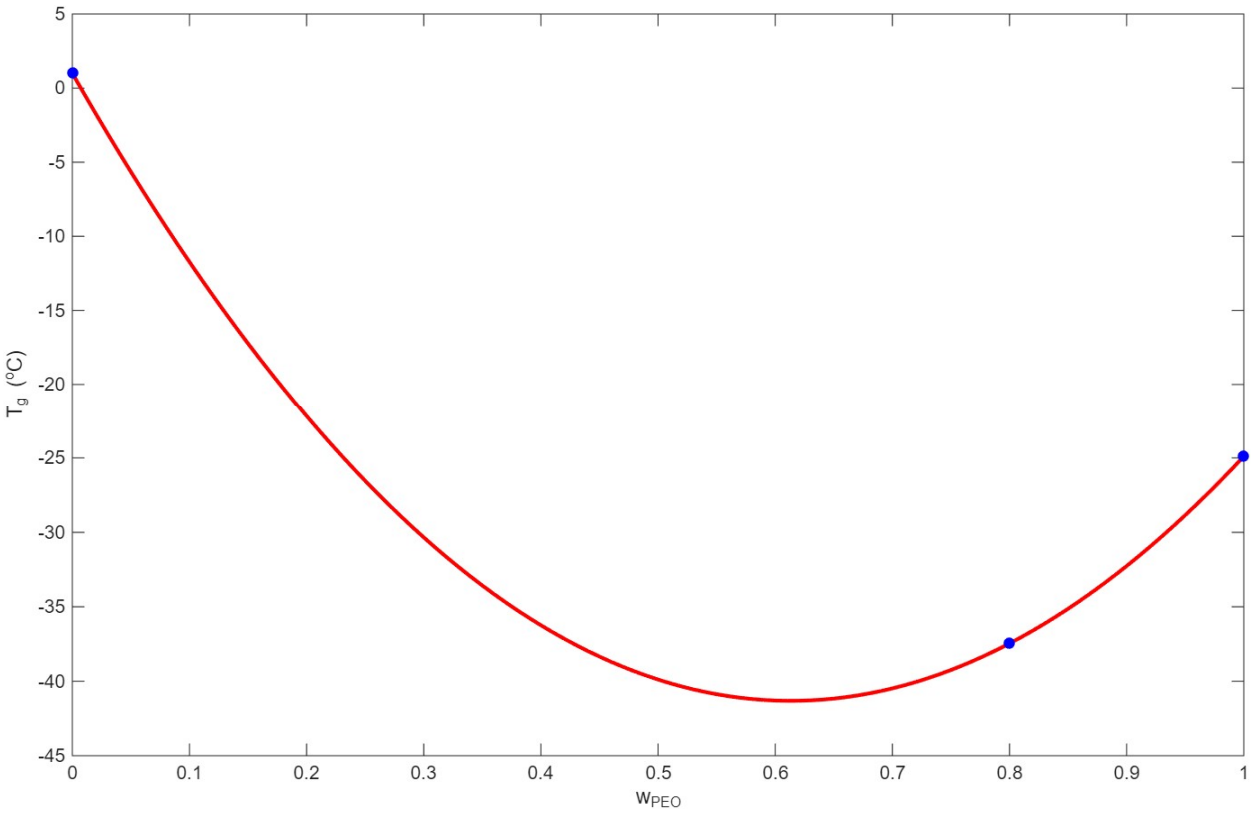

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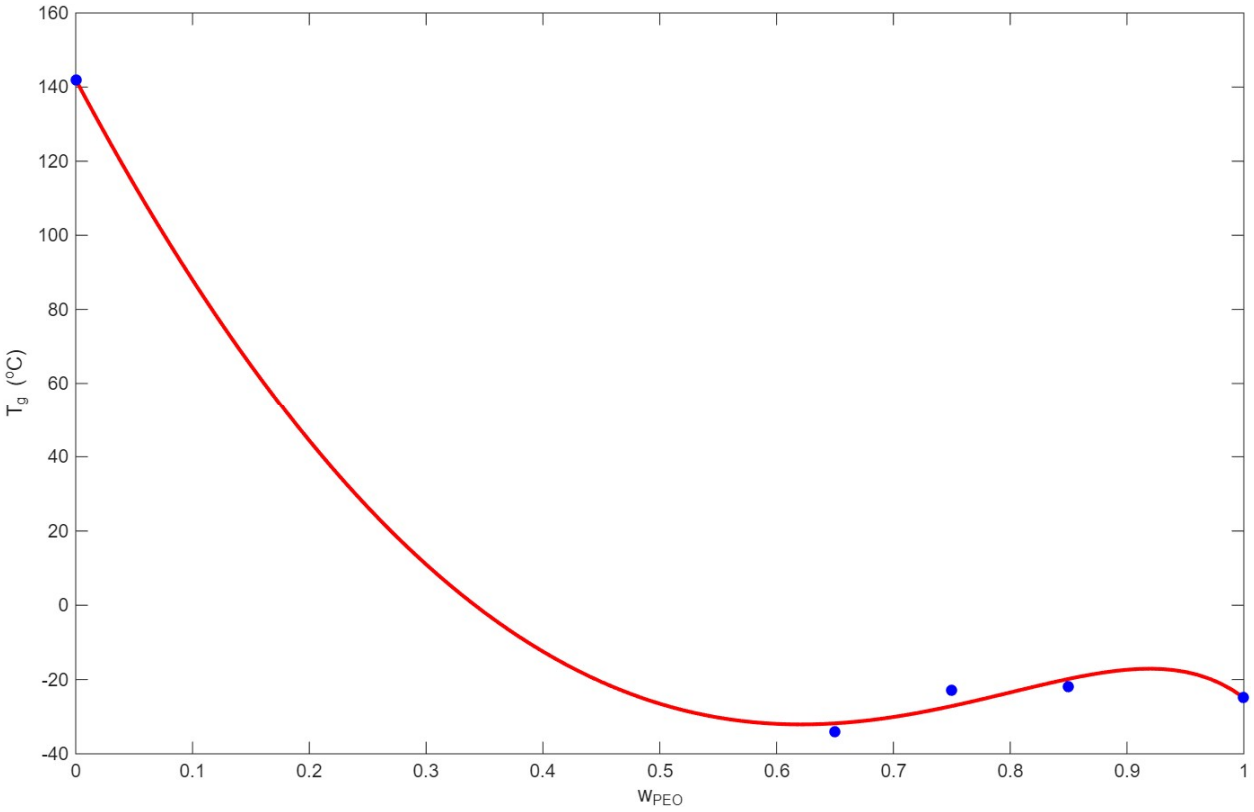

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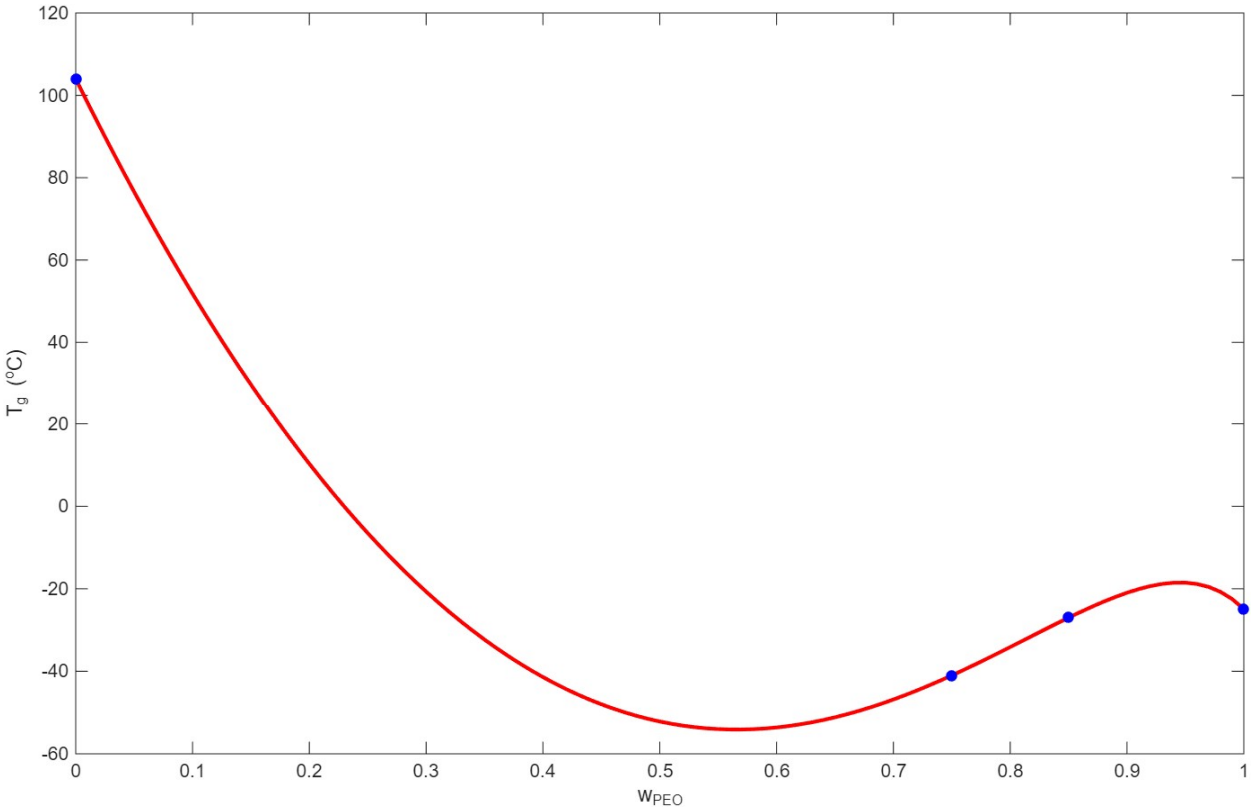
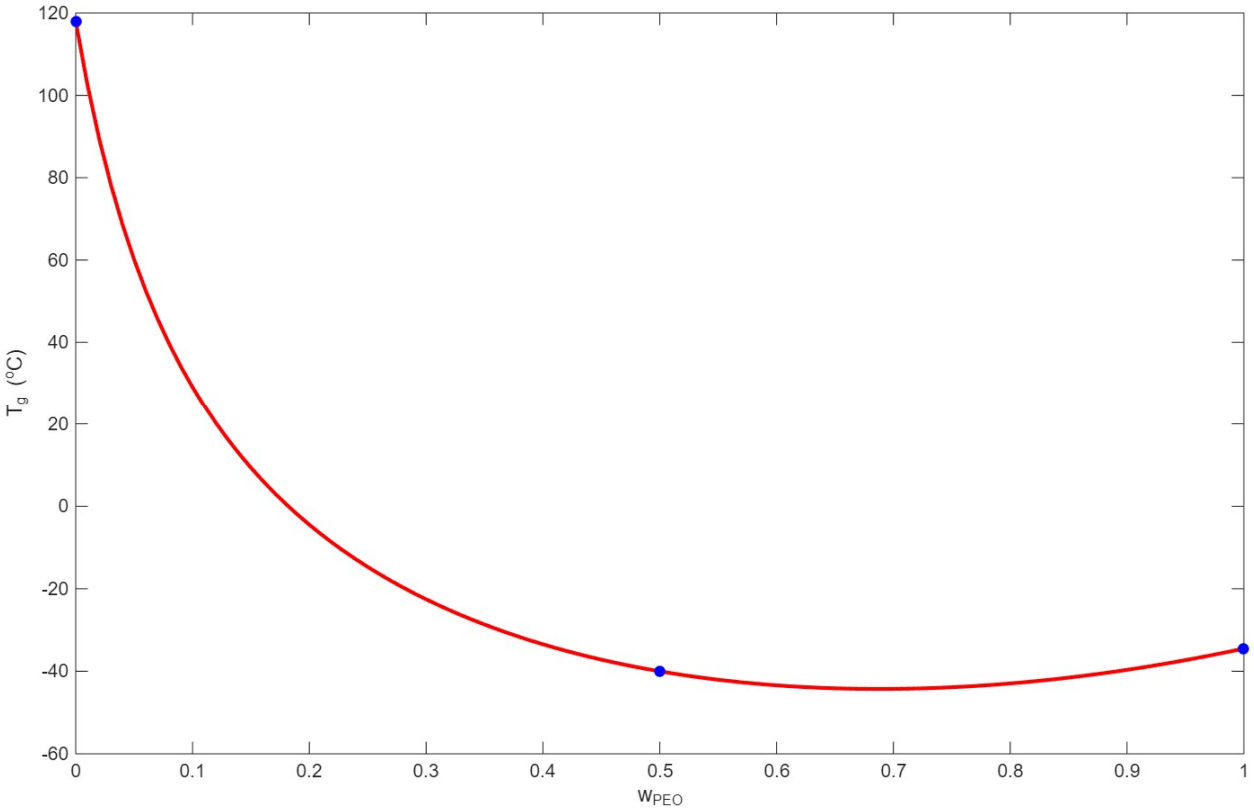


Figure S5. T_g data for PEO/P2VP/$LiClO_4$ blends at $r = 0.1$ in blue dots and Kwei fit in red from Li & Kahn and PEO homopolymer data from Kim et al.[1,4]



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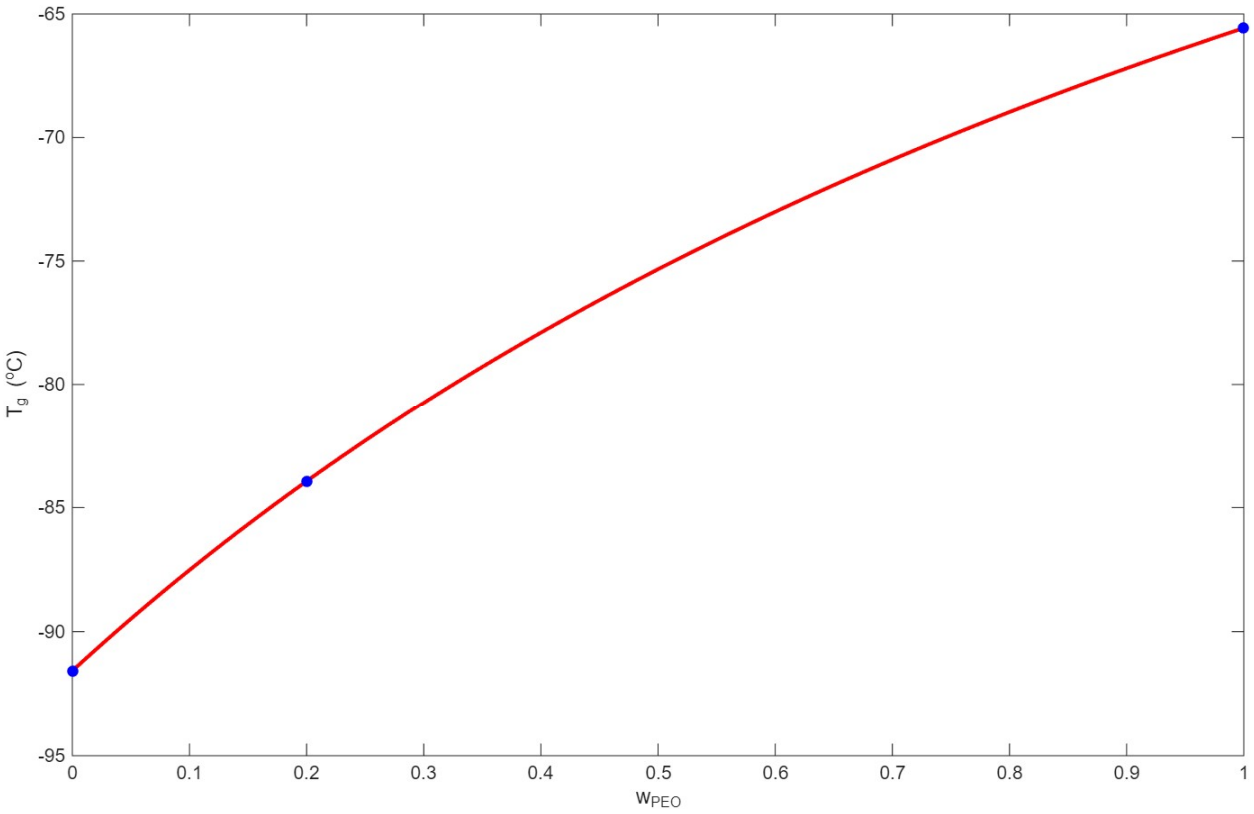

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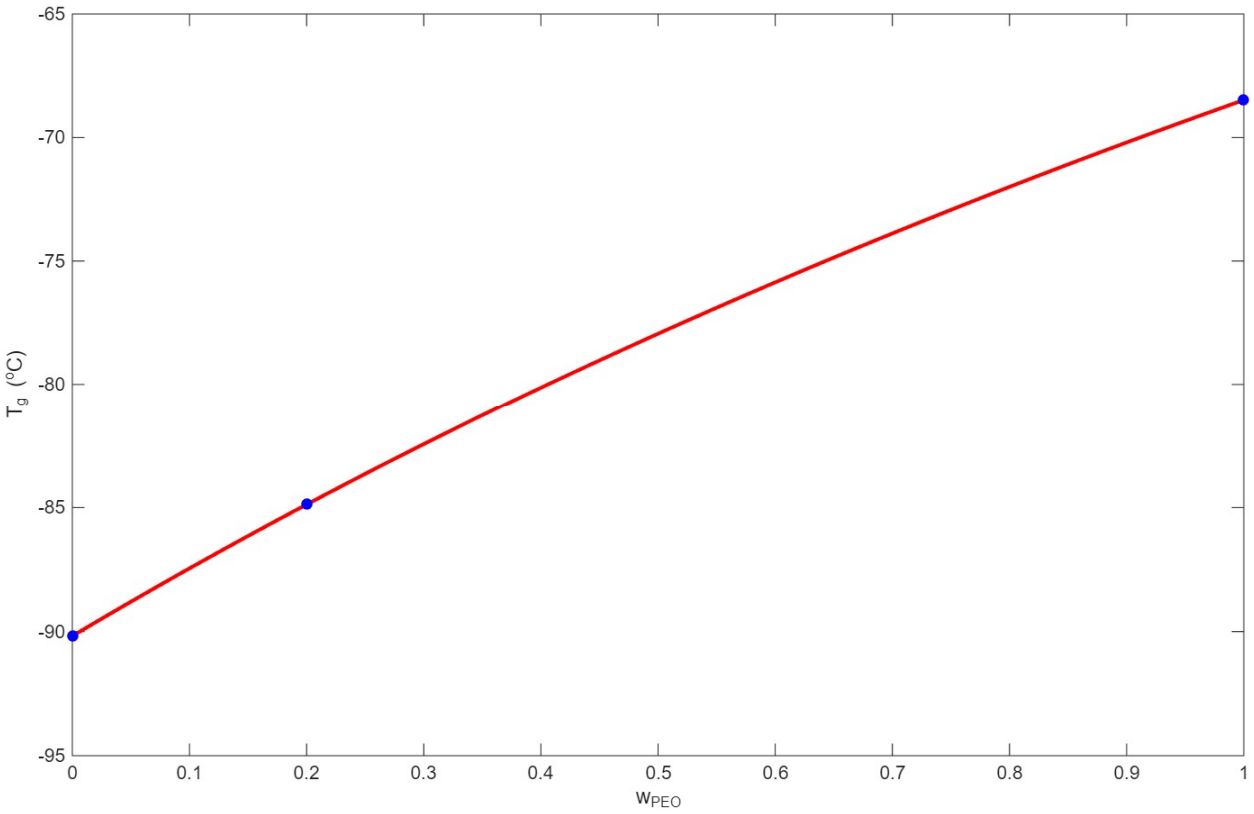

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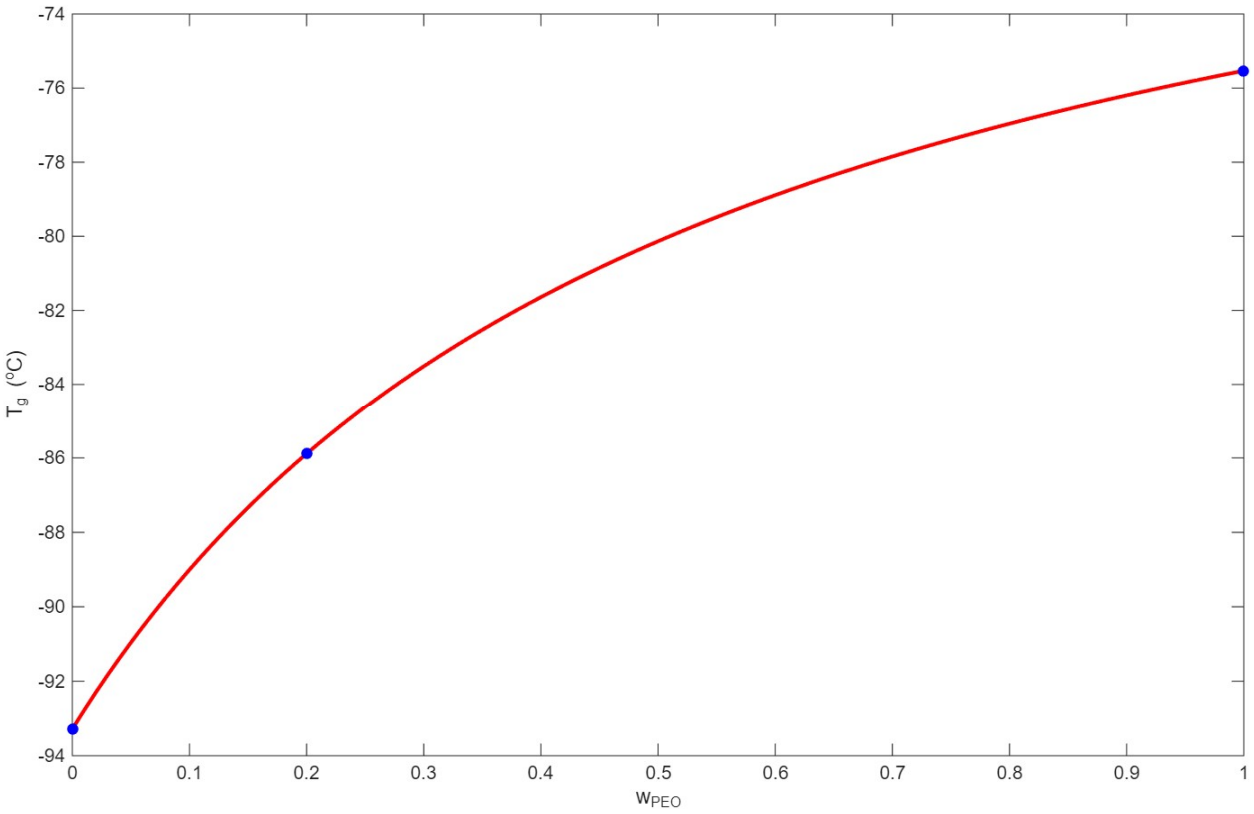

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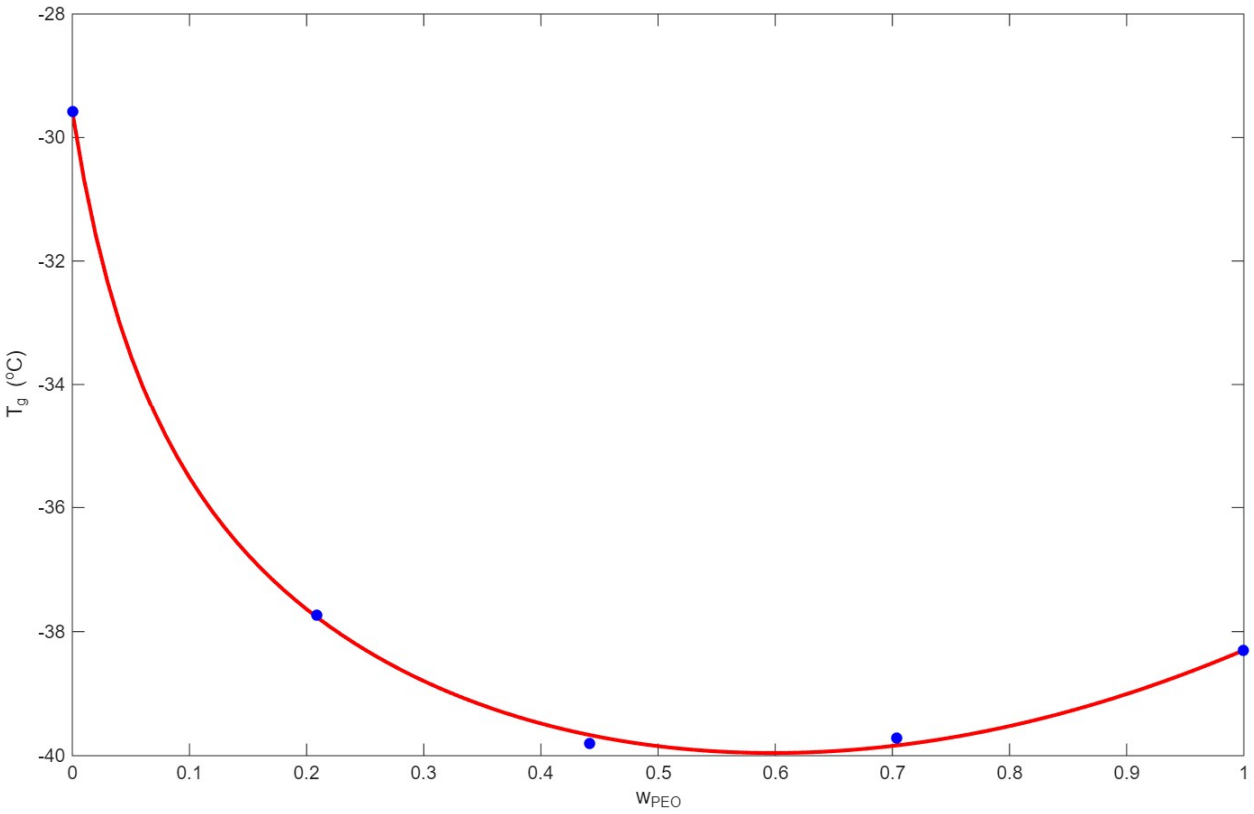

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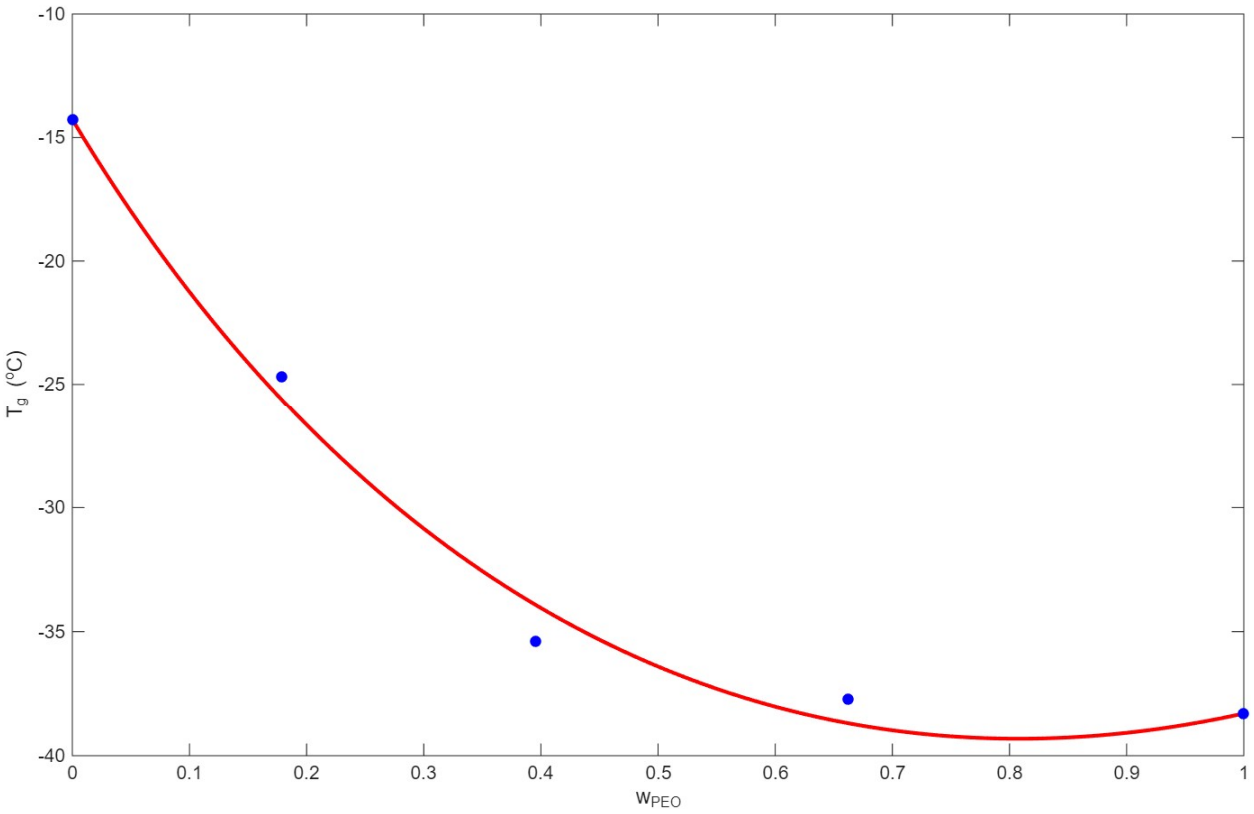

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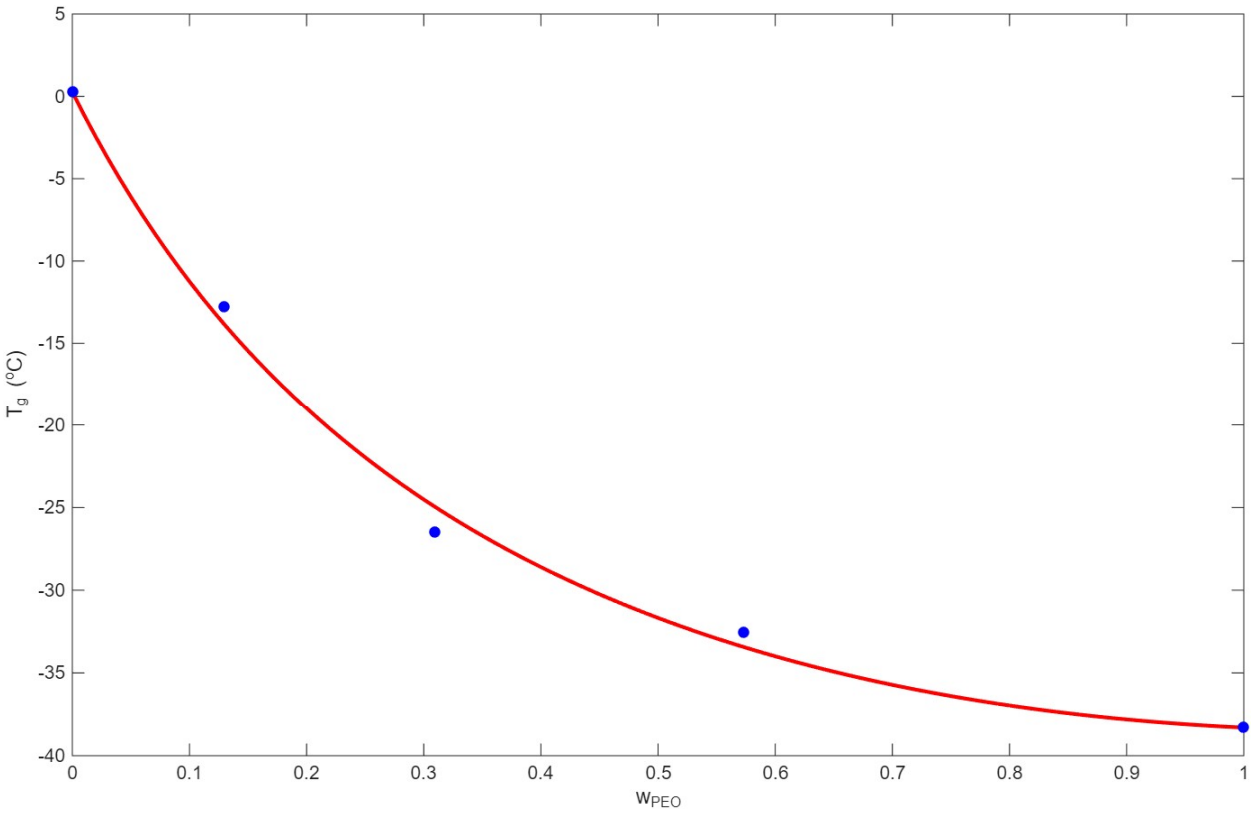

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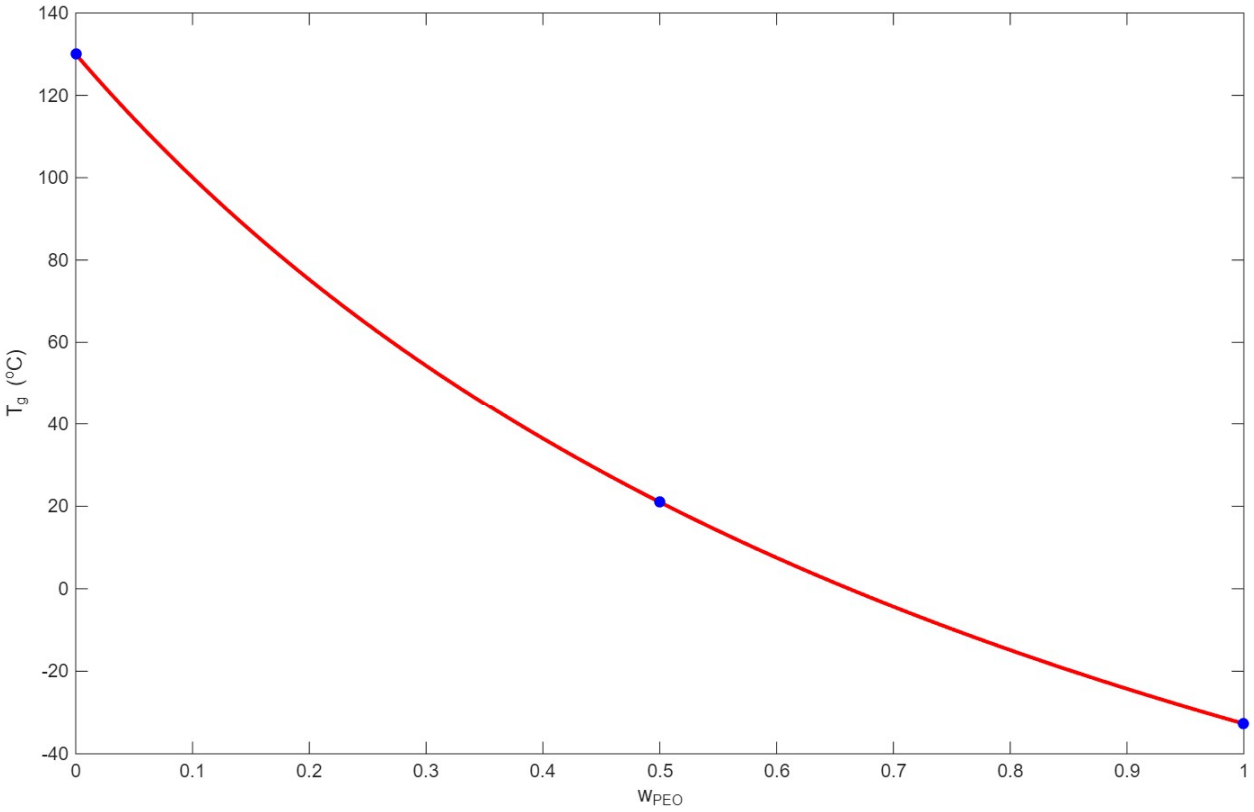

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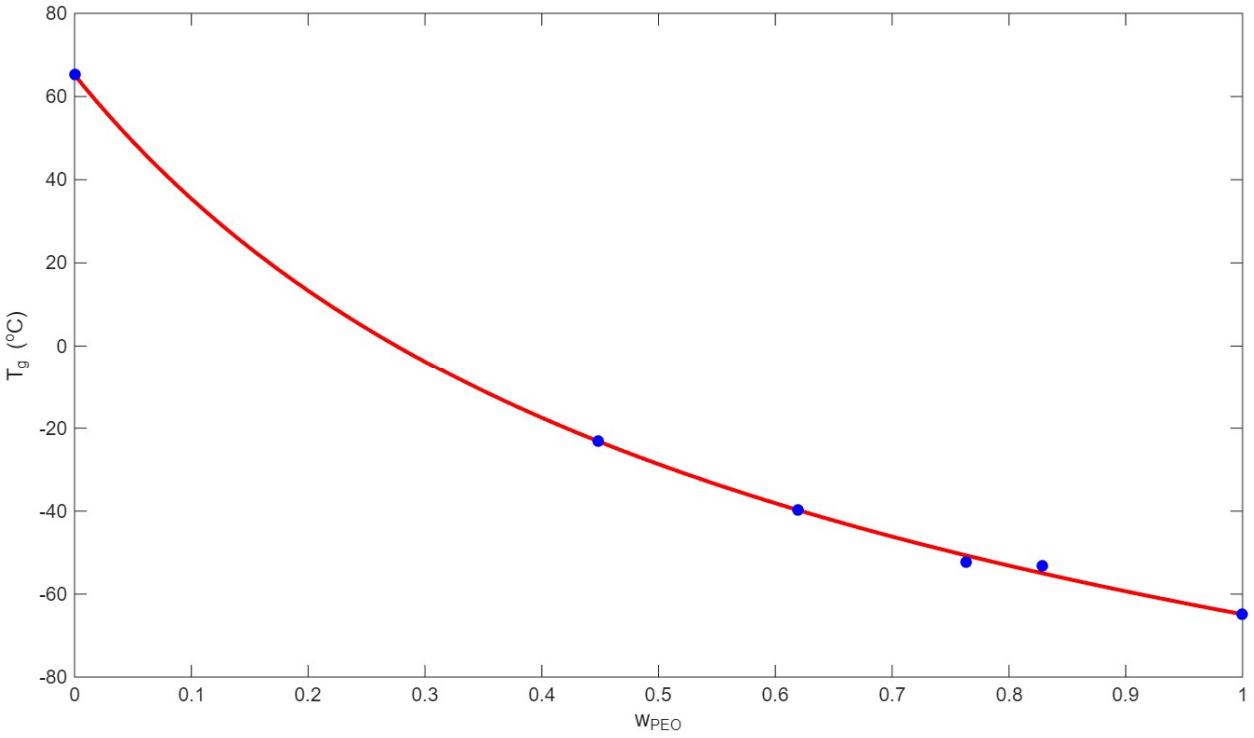

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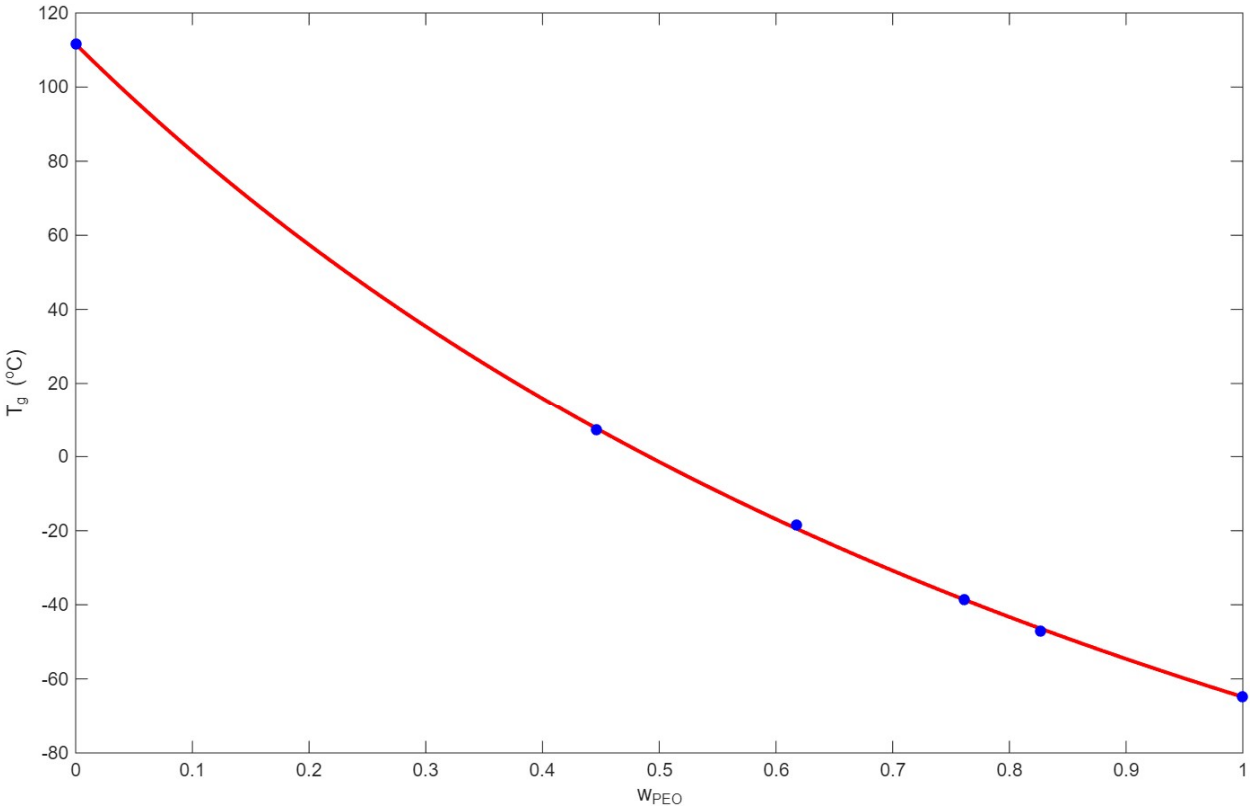

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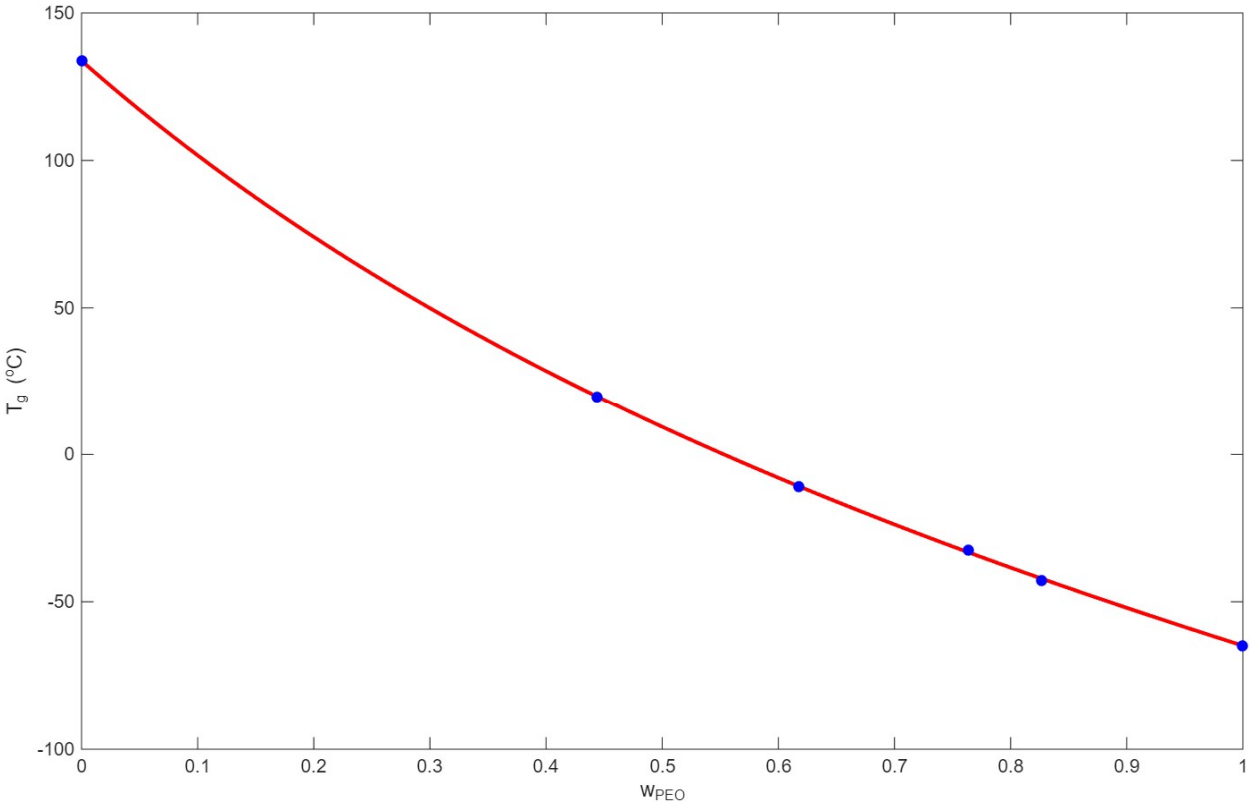

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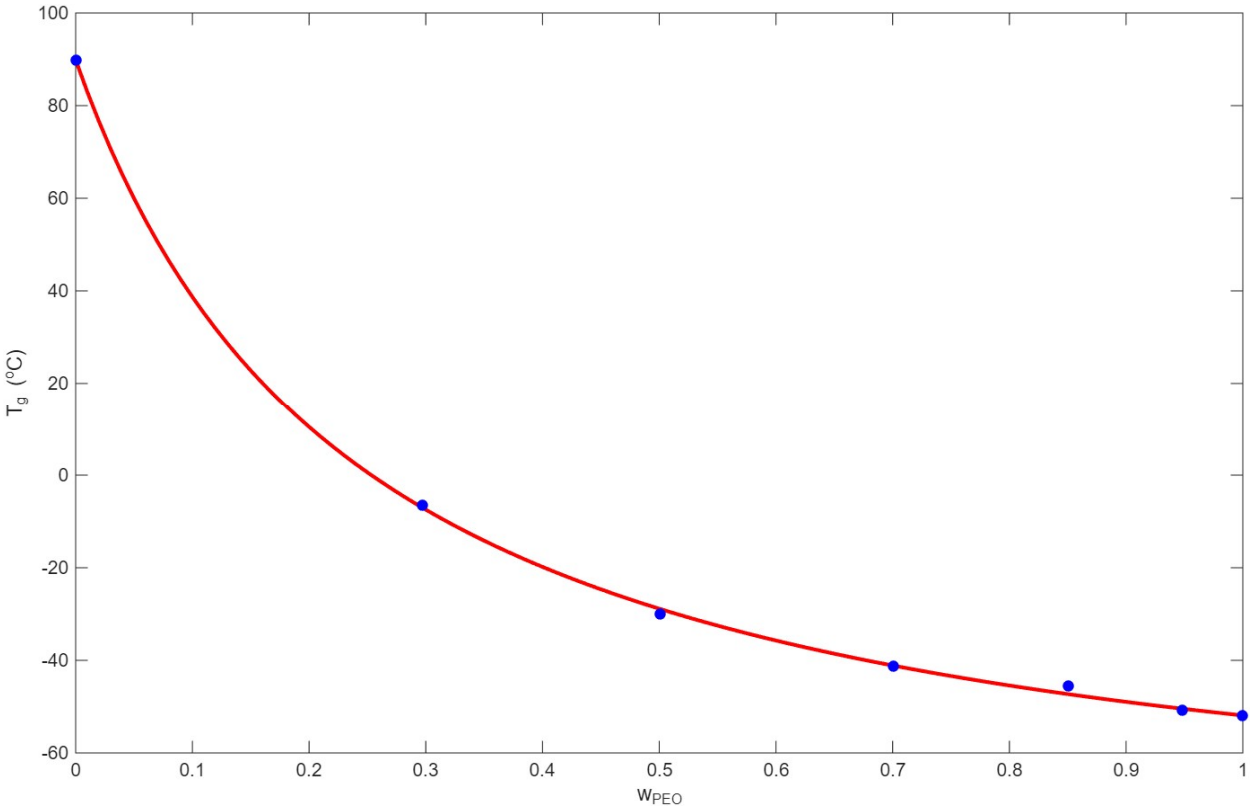

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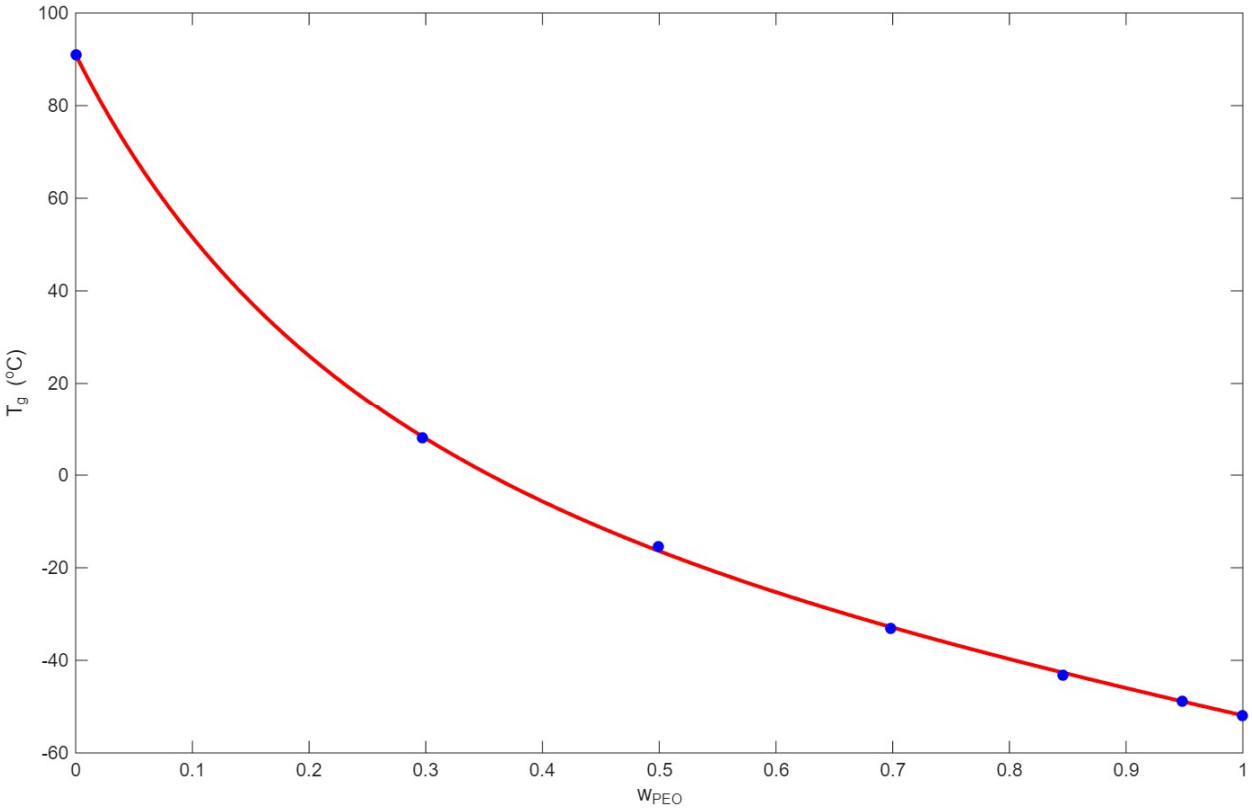


Figure S18. T_g data for PEO/PLiMTFSI blends with MW PLiMTFSI = 50 kDa in blue dots and Kwei fit in red from Olmendo Martinez et al.[10]

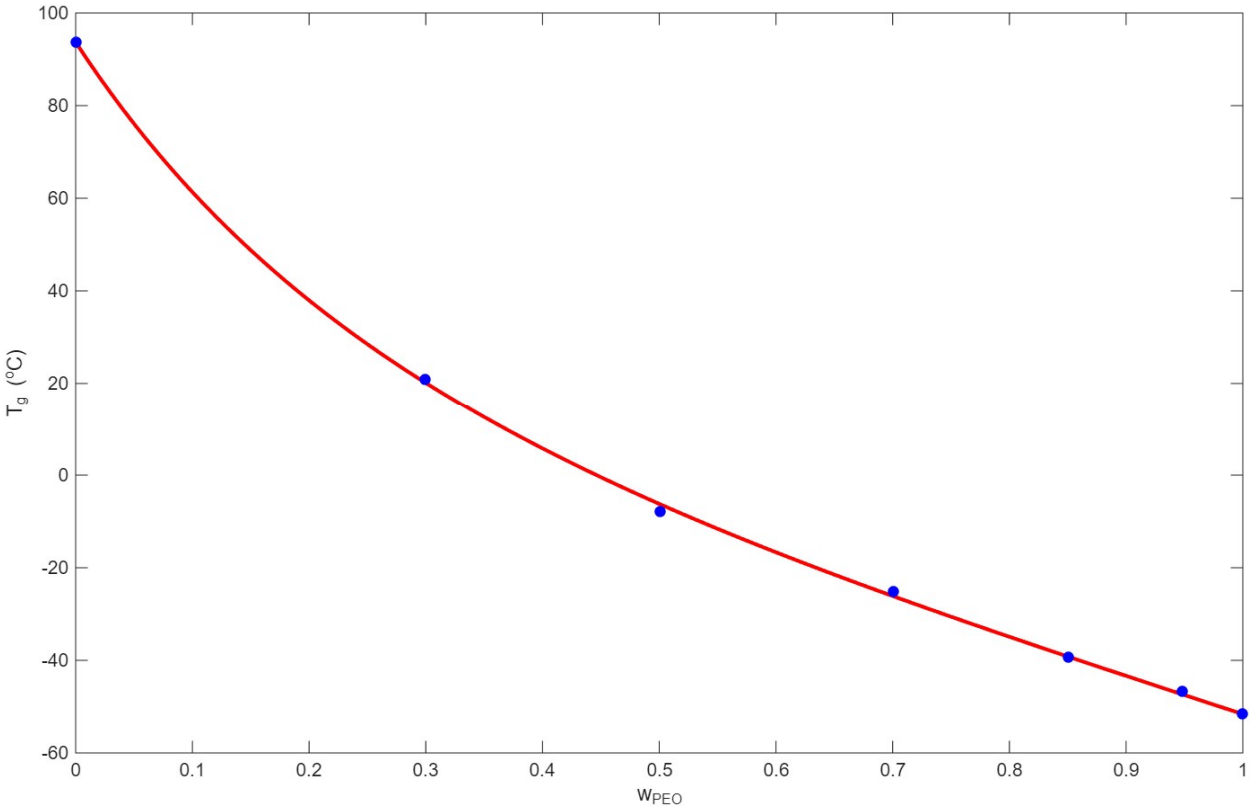


Figure S19. T_g data for PEO/PLiMTFSI blends at with MWP2 = 2000 kDa in blue dots and Kwei fit in red from Olmendo Martinez et al.[10]

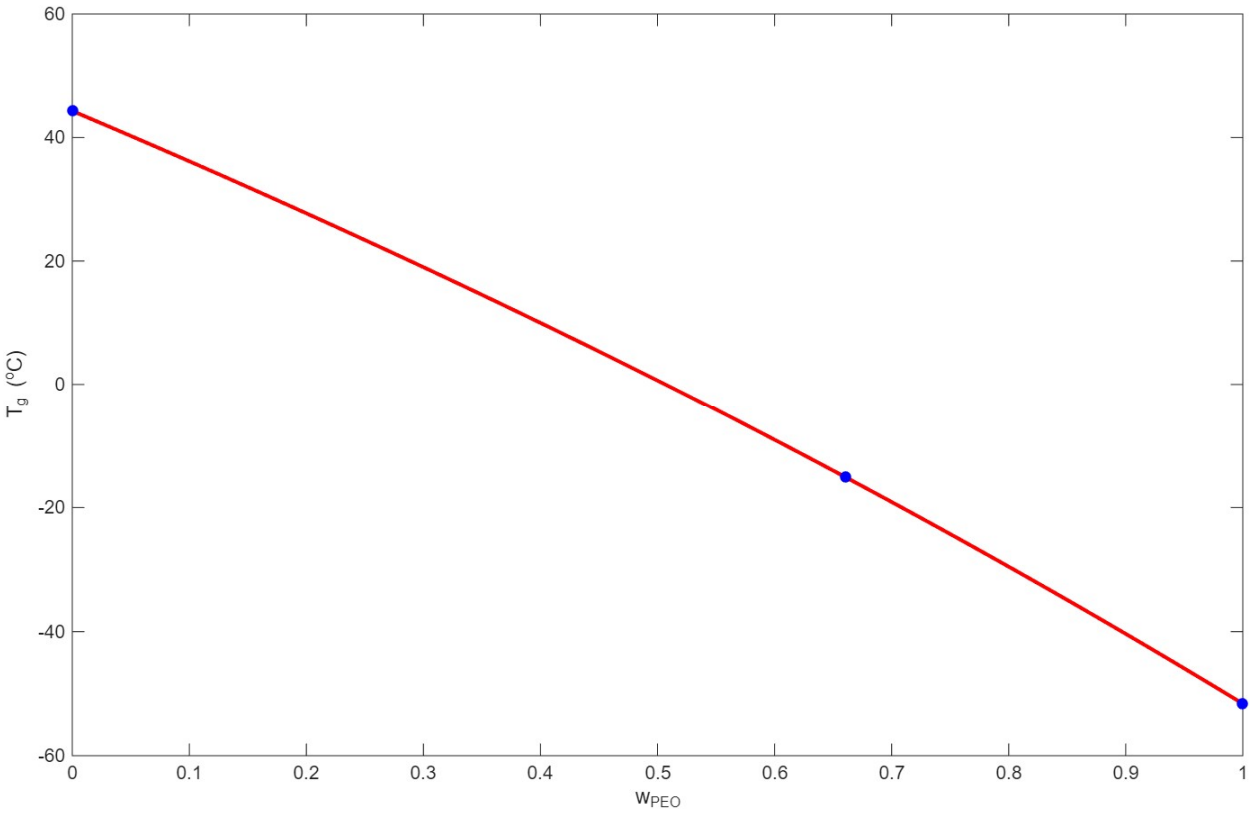


Figure S20. T_g data for PEO/PLiPSsTFSI blends in blue dots and Kwei fit in red from Ma et al.[11]

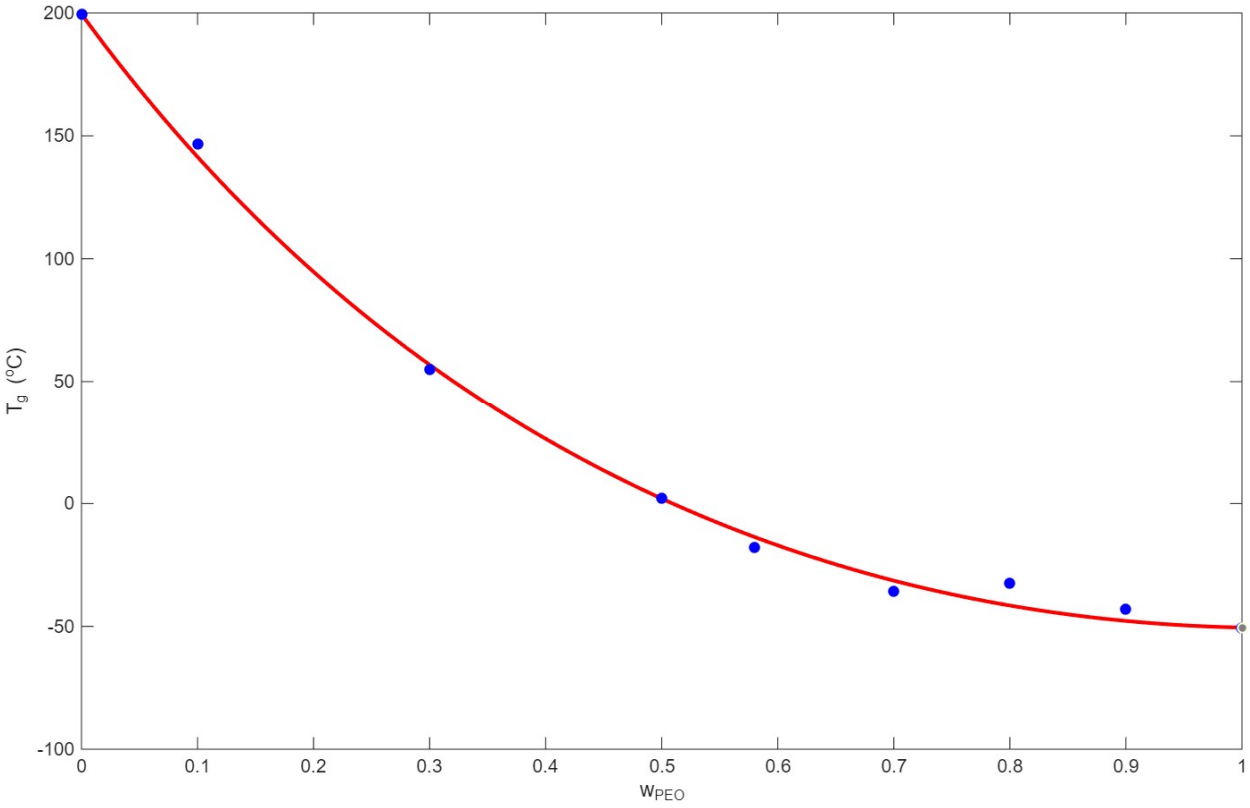
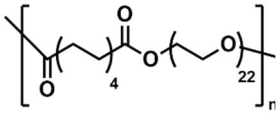
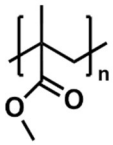
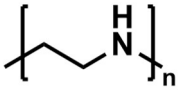
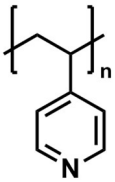
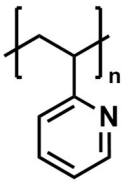


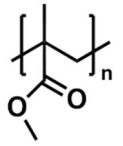
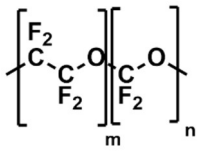
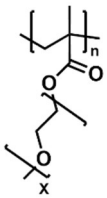
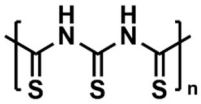
Figure S21. T_g data for PEO/ p5PhTFSI-Li with P5PhTFSI-Li MW = 32 kDa blends in blue dots and Kwei fit in red from Nguyen et al.[12]

Table S1. Activation Energy and Prefactor VTF Fits for PEO/P2/$LiClO_4$ Polymer Blend Electrolytes.

Polymer 2 (P2)	$M_{n,PEO}$ (kDa)	$M_{n,P2}$ (kDa)	w_{PEO}	r	E_a	A	ref
PES 	$5x10^3$	1	0		-	-	Kim et al.[1]
			0.2	0.1[a]	2.102	6739	
			0.4		2.530	7196	
			0.6		0.931	6670	
			0.8		0.183	6746	
			1		0.220	8204	
			0.4	0.01[a]	5.820	11263	
			0.4	0.02[a]	5.117	10427	
			0.4	0.05[a]	3.456	9103	
			0.4	0.2[a]	26.859	9241	
PMMA 	100	120	0.5	0.1	-	-	Ghelichi et al.[2]
PEI 	70	87	0.8	0.07[a]	0.312	4467	Tanaka et al.[3]
				0.1[a]	1.230	7354	
				0.14[a]	11.074	11094	
				0.25[a]	234.501	18007	
	10^3	87	0.8	0.07[a]	1.861	8379	Tanaka et al.[3]
				0.1[a]	6.864	7916	
				0.14[a]	46.860	11841	
				0.25[a]	381.378	18794	
P4VP 	600	50	0.75	0.1	1.723	11189	Li & Khan[4]
				0.125	3.676	11954	
				0.167	0.927	8587	
				0.25	0.368	7792	
P2VP 	600	200	0.85	0.04	296.528	15425	Li & Khan[4]
				0.05	81.530	12896	
				0.07	144.758	13679	
				0.1	77.755	11491	
				0.2	10.003	9175	

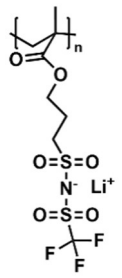
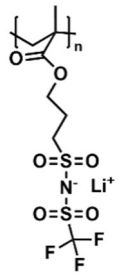
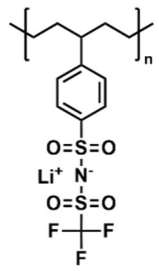
[a] *indicates that both polymers participate in ion solvation and are included in the r calculations*

Table S2. Activation Energy and Prefactor VTF Fits for PEO/P2/LiTFSI Polymer Blend Electrolytes.

Polymer 2 (P2)		$M_{n,PEO}$ (kDa)	$M_{n,P2}$ (kDa)	w_{PEO}	r	E_a	A	ref
PMMA 		10	11	0.5	0.05	3.374	11700	Sharon et al.[5]
PFPE 		0.4	1	0.2	0.026[a]	4.343	10453	Wong et al.[6]
		0.4	1	0.2	0.015[a]	-	-	
		0.4	1	0.2	0	-	-	
POEMX 	POEM9	30	5.8	0.44	0.1[a]	11.854	9610	
	POEM5	30	7.3	0.40	0.1[a]	12.284	9752	Gallmeyer et al.[7]
	POEM2	30	8.2	0.31	0.1[a]	4.710	9487	
PDTOA 		5	6.5	0.5	0.06	0.547	3613	Jo et al.[8]

[a] *indicates that both polymers participate in ion solvation and are included in the r calculations*

Table 3 Activation Energy and Prefactor VTF Fits for PEO-Based Single-Ion Conducting Polymer Blend Electrolytes

Polymer 2	*EO Polymer*	$M_{n,1}$ (kDa)	$M_{n,2}$ (kDa)	w_{P1}	r	E_a	A	ref
PLiMTFSI 	POEM	5.9	25	0.44	0.2	-	-	Yang & Epps[9]
				0.62	0.1	-	-	
				0.76	0.05	31.676	15881	
				0.83	0.03	0.133	11173	
			52	0.44	0.2	-	-	
				0.62	0.1	-	-	
				0.76	0.05	-	-	
				0.83	0.03	-	-	
			7	0.44	0.2	0.266	9703	
				0.62	0.1	1.451	11751	
				0.76	0.05	1.123	10042	
				0.83	0.03	0.292	10344	
PLiMTFSI 	PEO	100	5	0.30	0.298	1.210	6976	Olmedo Martinez et al.[10]
				0.50	0.128	3.311	10992	
				0.70	0.055	0.804	8257	
				0.85	0.022	0.135	6713	
				0.95	0.006	-	-	
			50	0.30	0.298	0.064	5058	
				0.50	0.128	1.157	6374	
				0.70	0.055	1.235	7651	
				0.85	0.022	0.182	6651	
				0.95	0.006	-	-	
			>2000	0.30	0.298	0.052	8572	
				0.50	0.128	0.031	4128	
				0.70	0.055	0.182	6622	
				0.85	0.022	0.008	3324	
				0.95	0.006	-	-	
P5PhTFSI-Li 	PEO	20	32	0.3	0.29	0.006	3961	Nguyen et al.[12]
				0.5	0.13	98.298	11614	
				0.58	0.087	0.187	7787	
				0.7	0.051	3.690	11039	
				0.9	0.013	0.038	6340	

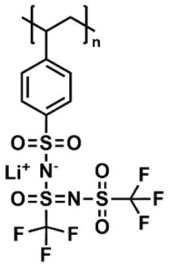
LiPSsTFSI 	PEO	-	20	0.66	0.05	1.269	7823	Ma et al.[11]

Table S4. T_g for P2 species considered in this study

P2	Mn (kDa)	Salt	r	T_g (°C)	Reference
PES	$5x10^3$	$LiClO_4$	0.1	-31.9	Kim[1]
PMMA	120	$LiClO_4$	0	114	Ghelichi[2]
PEI	87	$LiClO_4$	0.1	1	Tanaka[3,13]
P2VP	50	$LiClO_4$	0	104	Li & Khan[4]
P2VP	200	$LiClO_4$	0	142	Li & Khan[4]
PMMA	11	LiTFSI	0	118	Sharon et al. [5]
PFPE	1	LiTFSI	0	-93.2	Wong et al.[6]
PFPE	1	LiTFSI	0.015	-90.2	Wong et al. [6]
PFPE	1	LiTFSI	0.026	-91.6	Wong et al. [6]
POEM9	5.8	LiTFSI	0.1	-29.6	Gallmeyer et al.[7]
POEM5	7.3	LiTFSI	0.1	-14.3	Gallmeyer et al.[7]
POEM2	8.2	LiTFSI	0.1	0.3	Gallmeyer et al.[7]
PDTOA	6.5	LiTFSI	0	130	Jo et al. [8]
PLiMTFSI	7	-	-	199.5	Yang & Epps[9]
PLiMTFSI	16	-	-	94.5	Yang & Epps[9]
PLiMTFSI	25	-	-	111.6	Yang & Epps[9]
PLiMTFSI	52	-	-	133.8	Yang & Epps[9]
PLiMTFSI	5	-	-	89.9	Olmedo Martinez et al.[10]
PLiMTFSI	50	-	-	91.0	Olmedo Martinez et al.[10]
PLiMTFSI	2k	-	-	93.7	Olmedo Martinez et al.[10]
P5PhTFSI-Li	32	-	-	199.6	Nguyen et al.[12]
LiPSsTFSI	20	-	-	44.3	Ma et al. [11]

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