Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Table S1. Summary of 1- and 3-layered graphite electrodes

Graphite Electrodes		Mass Loading (mg/cm^2)	Measured Thickness from SEM (μm)	Calculated Porosity	Measured Porosity from Mercury Porosimetry
1-Layered		9.0	103	25%	27%
3-Layered	Top Layer	2.8	36	35%	29% (overall)
	Middle Layer	3.2	36	25%	
	Bottom Layer	3.2	32	15%	

Table S2: Graphite anode parameters in numerical model.

Parameter	Symbol	Value
Porosity	ϵ_e	15%-35%
Active solid fraction	$1 - \epsilon_e$	92%
Particle diameter	a_r	16.9 μm
Active specific surface area	a	2.83 m^2/g
Tortuosity	τ	$\epsilon_e^{-0.5}$
Equilibrium potential (V)	E_{eq}	Fig. S1
Electrical conductivity	σ	100 S/m
Solid phase Li^+ diffusivity	D_s	1.45×10^{-13} m^2/s
Maximum concentration of Li in anode	c_s^{max}	29047
Initial intercalation fraction		0.01
Maximum intercalation fraction		1
Anodic exchange current density	i_0	$i_0 = Fkc^{0.5}\left(c_s^{max} - c_s\right)^{0.5} c_s^{0.5}$
Reaction rate constant	k	4.9×10^{-11} $\frac{m^{2.5}}{mol^{0.5}s}$
Anodic transfer coefficient	α	0.5

Table S3: Electrolyte parameters in numerical model.

Parameter	Symbol	Value
Initial salt concentration	c_o	1200 mol/m^3
Ionic conductivity	κ	See Figure S1
Li$^+$ diffusivity	D	
Effective ionic conductivity	κ_{eff}	$\kappa_{eff} = \kappa \times \frac{\epsilon_e}{\tau}$
Effective Li$^+$ diffusivity	D_{eff}	$D_{eff} = D \times \frac{\epsilon_e}{\tau}$
	$\partial f_{\pm}/\partial \ln c$	See Figure S1
Transference number	t_+	See Figure S1

Table S4: Lithium metal electrode parameters in numerical model.

Parameter	Value
Exchange current density	20 A/m^2
Anodic transfer coefficient	0.5
Cathodic transfer coefficient	0.5
Equilibrium potential	0
Electrolyte reference concentration	1200 mol/m^3

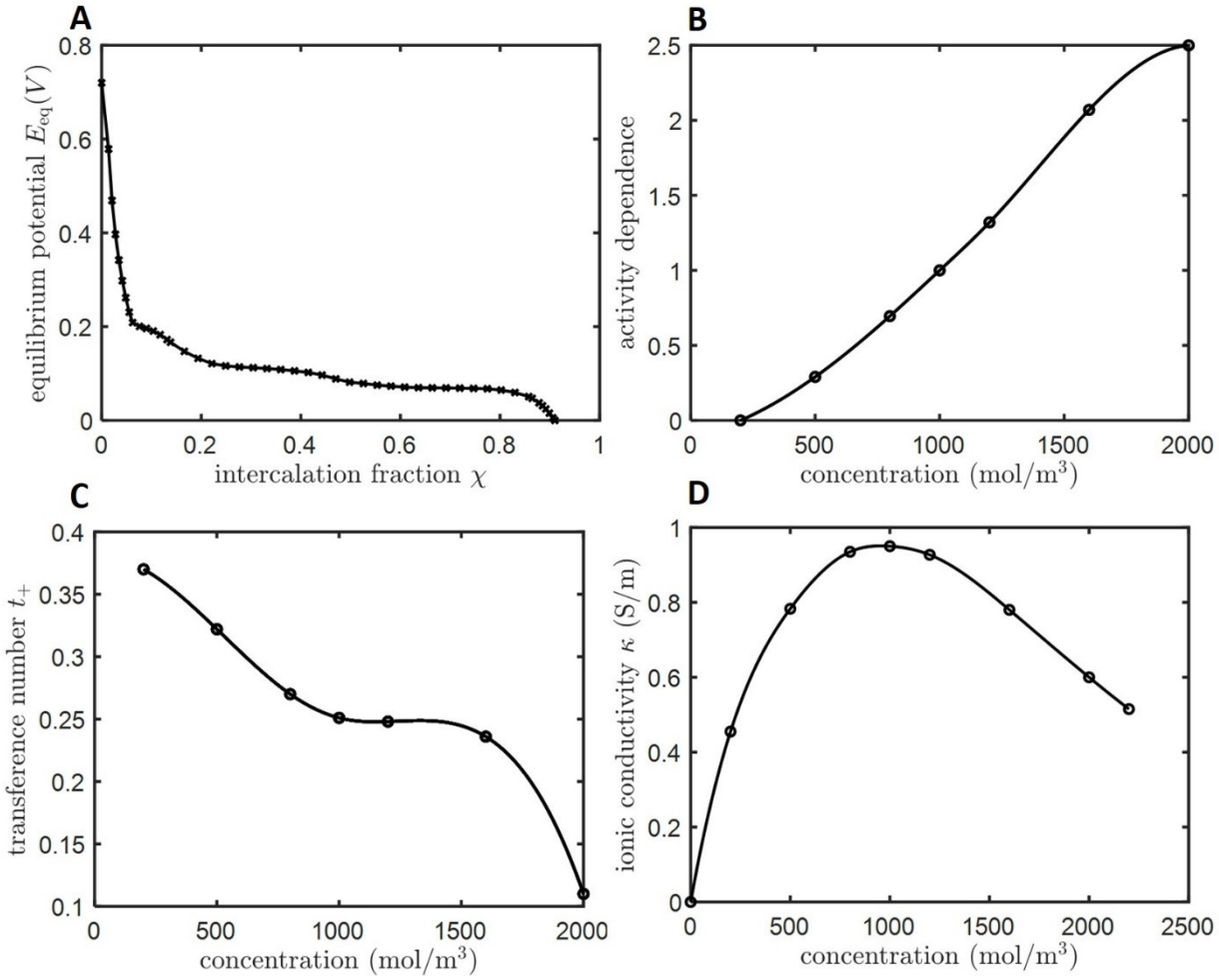

Figure S1: Material properties used in simulations of mono- and tri-layered graphite anode half-cells. A. Graphite equilibrium potential function. B. Ionic conductivity κ C. transference number t_+ and D. activity coefficient as a function of Li^+ concentration c.