

## Three dimension modelling of the components in supercapacitors for proper understanding and contribution of each parameter to the final electrochemical performance

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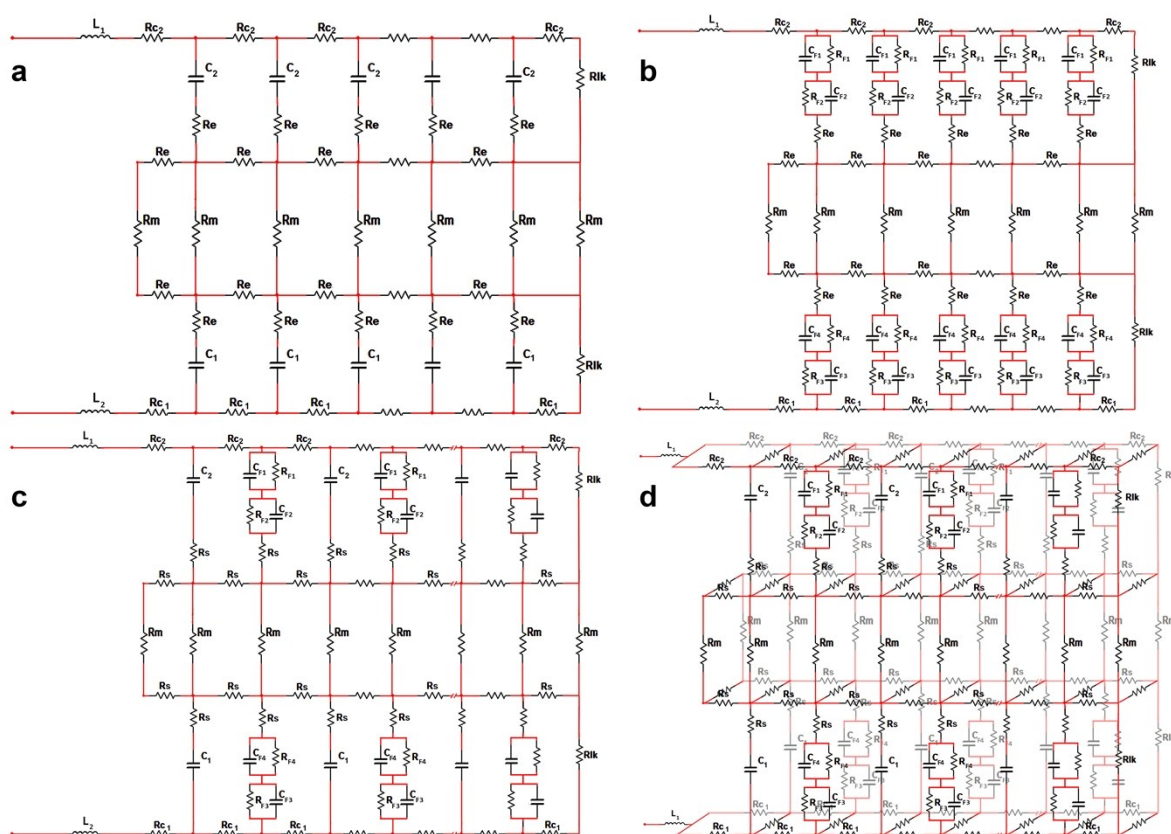


Figure S1. (a) 2D equivalent electrical model for full cell of the porous electrode in EDLCs, (b) RECs and, (c) Hybrid material and (d) 3D electrical equivalent model of practical ECs

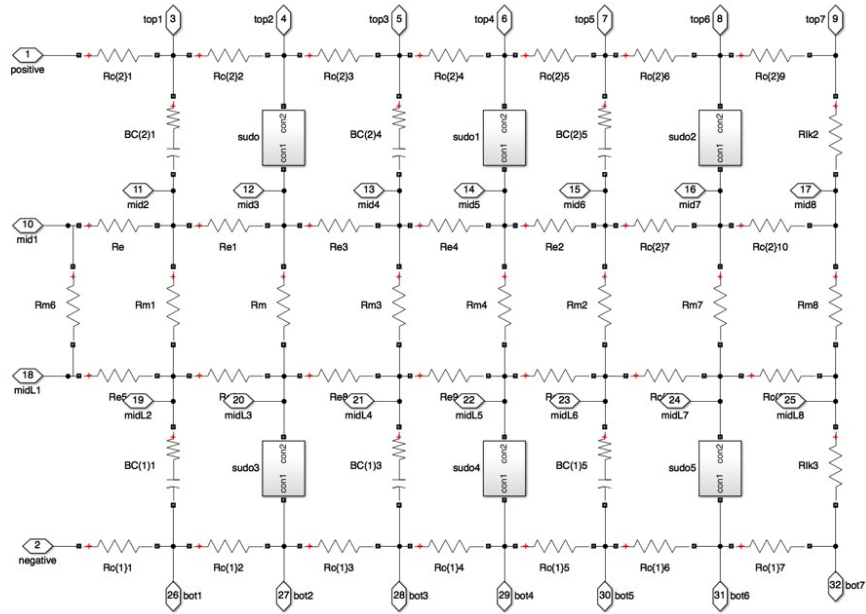


Figure S2. 2D supercapacitor model in Simulink

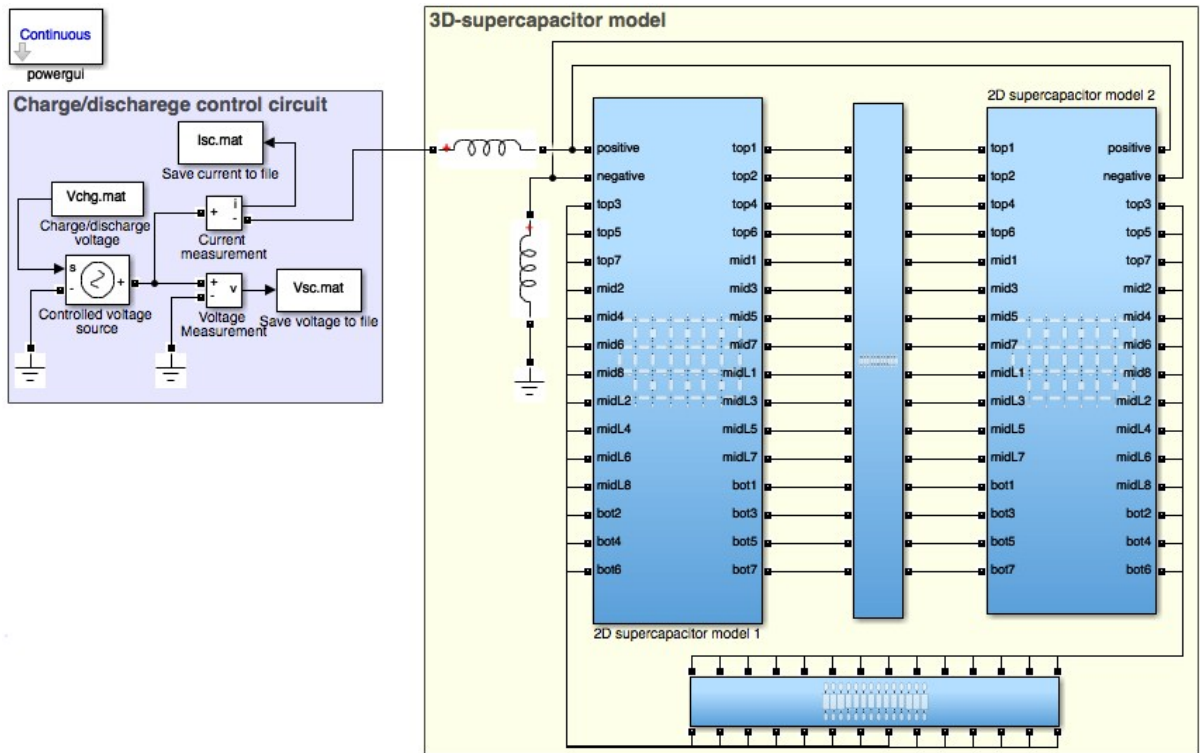


Figure S3. 3D Simulink model of the supercapacitor for simulation

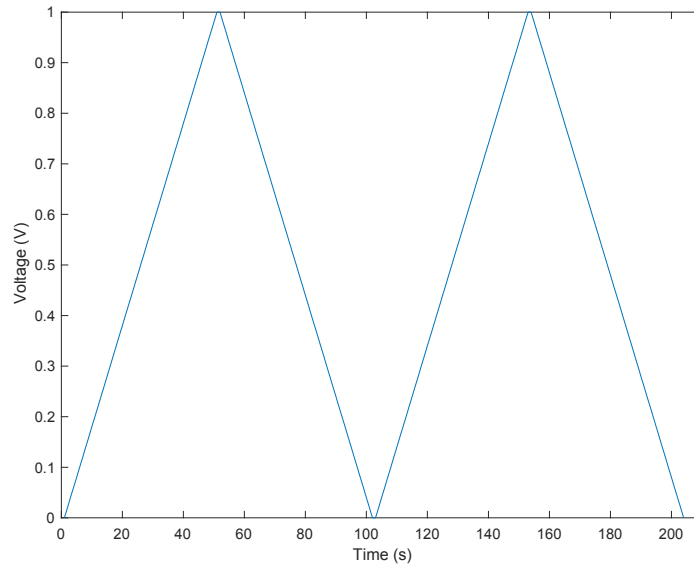


Figure S4. Saw tooth voltage charge/discharge waveform for the simulation cell performance

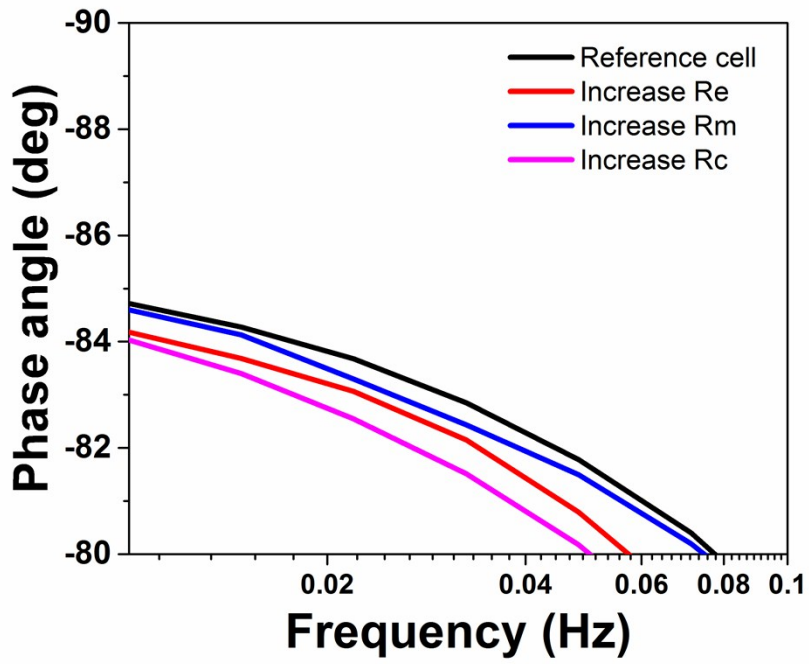


Figure S5. An enlarged view of the phase angle versus frequency in reality