

Supporting Information

Micro-battery Development for Juvenile Salmon

Acoustic Telemetry System Applications

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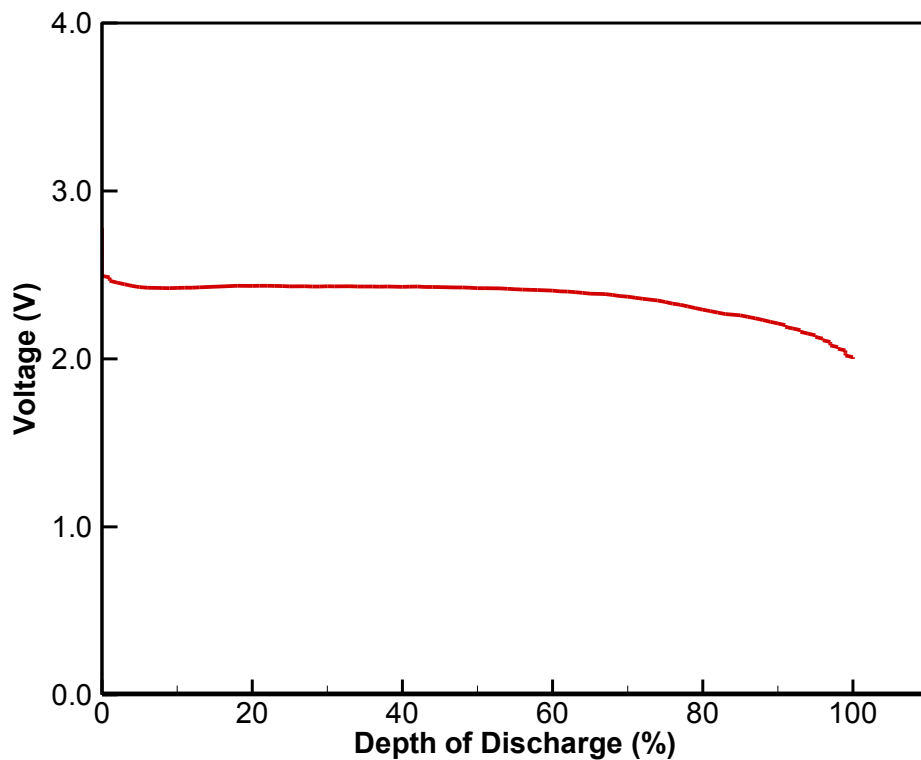


Figure S1. Voltage variation at different depth of discharge of MB306 battery at 0.1C (1C = 864mA/g) current rate (~1 mA). The flat voltage plateau is necessary to steadily drive the circuit board in the transmitter.

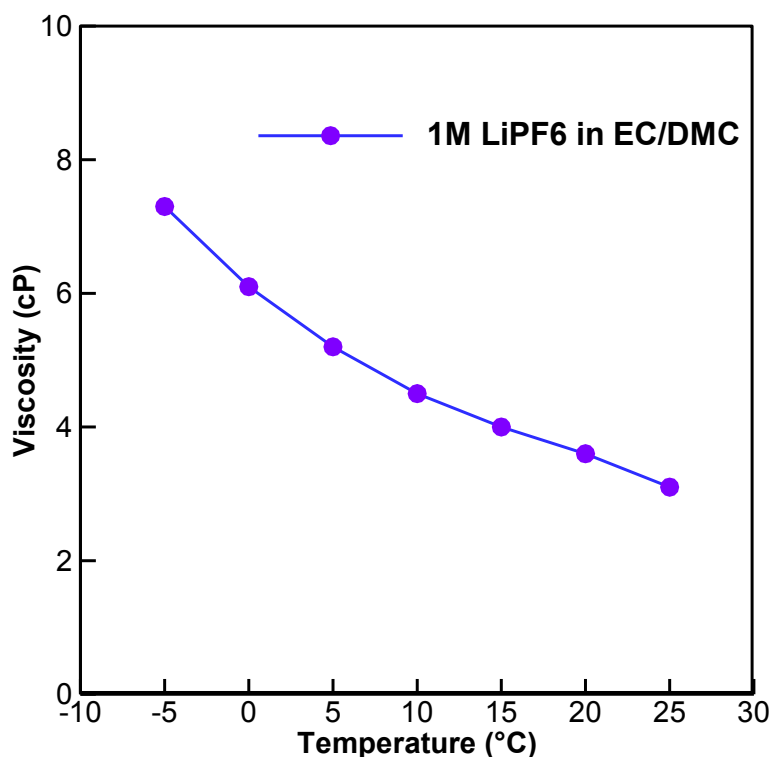


Figure S2. Measured viscosity of electrolyte (1M LiPF₆ in EC/DMC, volume ratio 1:1) at temperatures ranging from -5°C to 25°C.

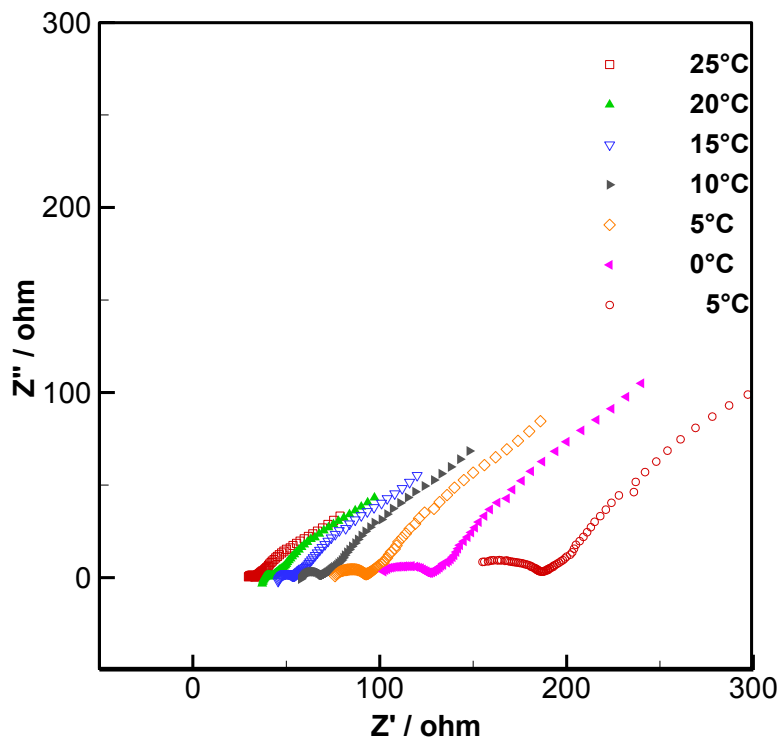


Figure S3. Comparison of the Nyquist impedance spectra of the SR416 cells at temperatures from -5°C to 25°C

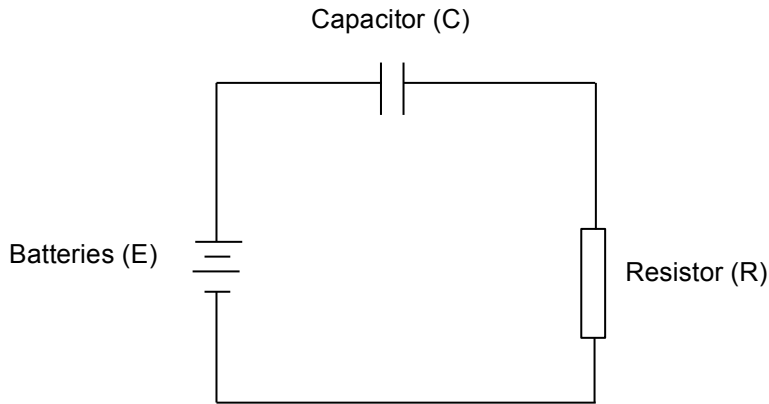


Figure S4. The transmitter can be simplified into a circuit consisting of a power supply (i.e., MB306 or SR416), a capacitor, and a resistor, connected in serial. The charging current of a capacitor is

$$I = \frac{V_b}{R} e^{-\frac{t}{RC}}$$

where V_b is the voltage applied on the external circuit, R is the resistor in the external circuit, and C is the capacity of the capacitor.

If we take the internal resistance of the battery (R_s) into consideration, the equation can be re-written as

$$I = \frac{E}{R + R_s} e^{-\frac{t}{(R+R_s)C}}$$

where E is the open circuit voltage of the battery. Thus, the maximum charge current of the transmitter is $I_{max} = \frac{E}{R+R_s}$. As shown in Fig. 4, the R_s of SR416 increased from 29 Ω at 25°C to 155 Ω at 0°C, which resulted in the significant maximum charge current decrease as shown in Fig. 5b. Because the R_s of the MB306 cell changed little with the temperature, the reduced charge peak current was negligible.