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## M2Po3A-03: Low-Temperature Energy Storage: Flexible Supercapacitors with Cotton Fiber and Silver Nanowires

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To address the challenges faced by traditional supercapacitors in low-temperature environments, such as hardening, brittleness, and poor fatigue resistance, this study proposes and fabricates a novel low-temperature flexible supercapacitor. By utilizing low-temperature flexible conductive materials with excellent flexibility and stability as electrodes and incorporating PVA-LiCl gel electrolyte, which exhibits outstanding performance at low temperatures, the supercapacitor achieves exceptional low-temperature capabilities. Experimental results show that the supercapacitor retains excellent flexibility and mechanical properties at  $-60^{\circ}\text{C}$  and maintains stable electrical performance after 10,000 low-temperature bending cycles, demonstrating superior fatigue resistance. Furthermore, the device maintains significant capacitance at  $-30^{\circ}\text{C}$ . This work provides an innovative solution to the challenges of energy supply in low-temperature environments, with promising applications in polar exploration, space exploration, and other extreme environments.

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