HelioCore Battery Technology

Technical Whitepaper

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Abstract

HelioCore is a new lithium-based battery architecture developed by Innovatech. This whitepaper describes the science and engineering behind the system, which combines high-capacity cathode materials with a proprietary solid electrolyte to achieve superior energy density, fast charging and long cycle life. Test results indicate HelioCore cells maintain more than 85% capacity after 1,000 cycles at 1C and operate safely at temperatures from –20°C to 60°C.

1. Introduction

HelioCore builds upon conventional lithium-ion designs by integrating advanced cathode chemistry and a ceramic solid electrolyte. The cathode employs a high-nickel layered oxide, increasing the theoretical capacity while maintaining structural stability. The solid electrolyte eliminates flammable liquid components and expands the operating temperature window. In this section, we summarize the architecture, materials and expected performance improvements over traditional cells.

Key performance metrics are summarized below:

Metric	Value
Energy Density	350 Wh/kg
Cycle Life (80% capacity)	3,000 cycles
Operating Temp Range	–20°C to 60°C
Charge Time to 80%	20 minutes
Nominal Voltage	3.7 V

2. Methodology & Results

Figure 2a: Capacity Retention vs Cycle Number

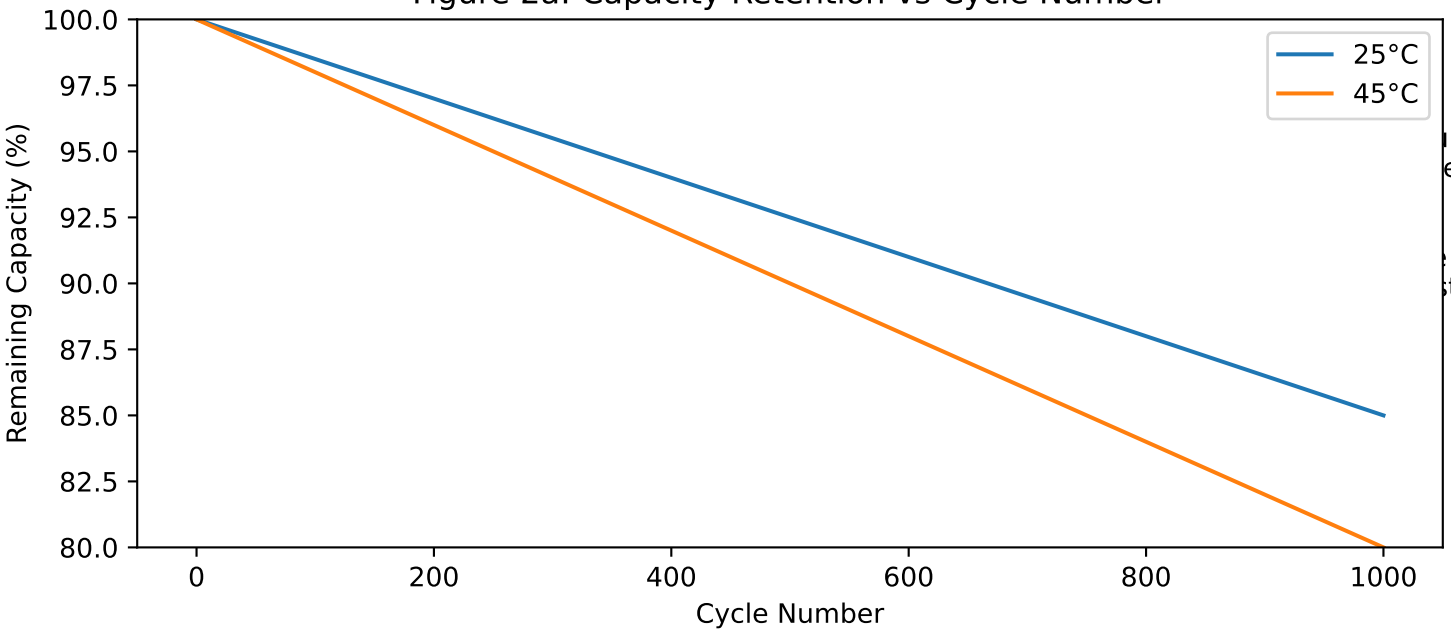

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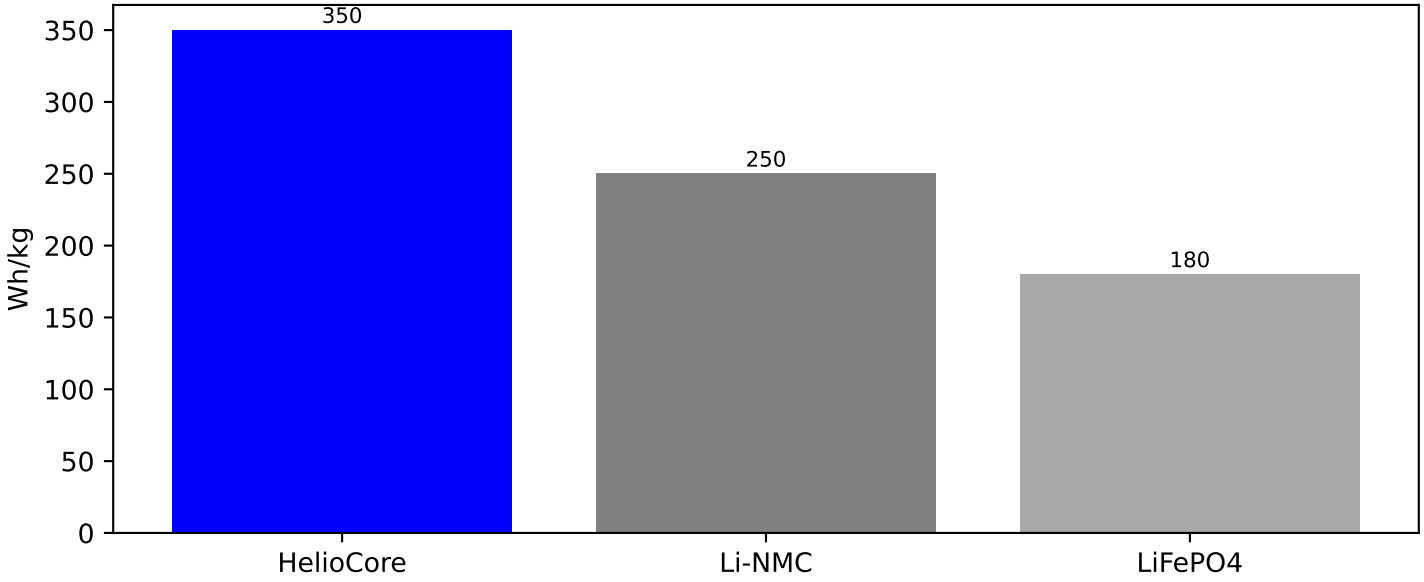
Figure 2b: Specific Energy Comparison



3. Conclusion & Future Work

HelioCore demonstrates significant improvements in energy density, safety and cycle life over current lithium-ion technology. Our testing shows superior performance across a wide temperature range and under high C-rate cycling. Future research will focus on scaling production to pilot lines, further improving the solid electrolyte interface, and optimizing cathode composition for even higher capacity.

In parallel, Innovatech is evaluating integration of HelioCore with advanced battery management systems and investigating recycling pathways for end-of-life cells. The commercialization of HelioCore technology is expected to begin in late 2026, ushering in a new era of energy storage solutions.