NEO Battery Showcases Mass-Producible Silicon Battery Prototype with Highest Capacity Retention Achieved to Date

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- NBMSiDE® P-300N: Advanced Prototype for Mass-Producibility Testing with Highest Capacity Retention Achieved to Date
  - Average Coulombic Efficiency of Over 99.8% with High Initial Capacity While Maintaining Low-Cost Production
  - Two Variations of P-300N Launched for Different Industry Requirements
- Undergoing Long-Term Battery Performance Testing with P-300N & High Capacity Retention Realized Over 300 Cycles
- Mass-Producibility Testing Conducted with P-300N
  - Will Produce Near-Commercial Batteries with 3 to 5 Ah Capacities with Global Battery Value Chain Players

NEO Battery Materials Ltd. ("NEO" or the "Company") (TSXV: NBM) (OTC: NBMFF), a low-cost silicon anode materials developer that enables longer-running, rapid-charging lithium-ion batteries, is pleased to introduce NBMSiDE® P-300N, an advanced silicon anode product with the highest capacity retention achieved to date. The P-300N is a mass-producible prototype optimized to enhance battery stability while maintaining low-cost production.

P-300N Silicon Anode: Highest Capacity Retention Achieved to Date

Building on the foundation of the P-300 silicon anode introduced in January, NBMSiDE® P-300N is the Company's latest engineering feat with the highest capacity retention achieved to date. NEO's R&D successfully refined the synthesis process and material characteristics while maintaining low costs and minimizing initial capacity loss.

NEO's priority is optimizing the 50-cycle average Coulombic Efficiency[1] (CE) on the half cell[2] using a 100% pure silicon anode. With this rigorous testing condition[3], a high CE over the first 50 cycles is strictly required for and determines high capacity retention in long battery performance tests of 300+, 500+, and 1,000+ cycles.

Compared to predecessors, the P-300N has recorded the highest 50-cycle average CE of over 99.8%. Moreover, due to the flexibility of NEO's synthesis method, two P-300N variations have been produced to cater to different industry needs:

- High-Capacity Variant: Demonstrates initial capacity over 2,000 mAh/g with an average CE of over 99.5% and maintaining performance with 50+ cycles
- High-Stability Variant: Provides a balance of cycle performance and capacity with an average CE of over 99.8% with approximately 2,000 mAh/g in initial capacity

P-300N is positioned as a low-cost, competitive solution for wide applications, including 1) electronics, power tools, or drone/UAV[4] that require high capacity with ultra-fast charging/discharging and 2) EV and energy storage that require high capacity with long-term stability.

Next Steps: Full Cell Testing & Scaling Up for Commercialization

Due to surpassing half cell results, NEO is undergoing long-term full cell[5] tests of 300+ cycles with the P-300N. With various cathode chemistries, P-300N is combined with graphite to form high-capacity

silicon-graphite anodes[6]. High capacity retention has been realized, but once all internal targets are achieved, the Company will announce technical results through a subsequent news release.

With scale-up efforts initiated as of February, the P-300N will be the main product for mass-producibility testing. A key advantage of the P-300N is its adaptability to mass production without modifying existing processing equipment. After completing small-scale optimization, NEO plans to manufacture near-commercial battery cells with 3 to 5 Ah capacities with global battery value chain players.

P-300N: Technical Details of Optimization

The upgraded P-300N incorporates key refinements in particle size distribution, shape control, and composite layer coating on the silicon particle. The composite layer coating offers enhanced protection against the direct contact of the silicon anode and electrolyte, mitigating capacity loss and improving cycling life. Additionally, a reinforced polymer coating network aids in mechanical stress dissipation without compromising conductivity between silicon particle structures.

[1]Coulombic Efficiency (CE): Ratio of electrons transferred out from an electrode material/battery during discharging to the number transferred into the material during charging over a full charging cycle (Discharging Capacity-to-Charging Capacity). Ex. If the current discharging capacity is 2,000 mAh/g and the preceding charging capacity was 2,500 mAh/g, the Coulombic efficiency is 80%.

[2]Half Cell/[5]Full Cell: Lithium-ion battery comprises all four core materials (cathode, anode, separator, and electrolyte). Generally, battery anode materials proof-of-concept and optimization are completed with half cells. Only the anode, separator, and electrolyte are used with a lithium-metal counter electrode that may supply infinite lithium ions. Full cells have a limited number of lithium-ions, given that commercial-level cathode materials retain a limited supply of lithium ions compared to lithium-metal. Consequently, capacity retention is heavily affected by Coulombic efficiency at every charging cycle.

[3]Lithium-ion battery anode materials are either comprised solely of graphite or trace amounts of silicon (approximately 2 to 10%) with graphite. Without graphite, an unprocessed 100% silicon anode's capacity degrades rapidly due to silicon's volume expansion. Even if a processed silicon anode is used, the technical and cost barriers preclude the commercialization of a 100% pure silicon anode. Therefore, the industry recognizes that a 100% pure silicon anode testing condition is one of the most technologically rigorous and challenging conditions for battery testing.

[4]UAV: Unmanned Aerial Vehicle

[6]Silicon-Graphite Anode: For commercial-level lithium-ion battery anodes, silicon anodes cannot wholly replace graphite anodes. Hence for certain batteries, silicon anodes and graphite anodes are mixed to form a blended anode called silicon-graphite anodes. On average, silicon anodes comprise approximately 5 to 10% of the anode material.

About NEO Battery Materials Ltd.
NEO Battery Materials is a Canadian battery materials technology company focused on developing silicon anode materials for lithium-ion batteries in electric vehicles, electronics, and energy storage systems. With a patent-protected, low-cost manufacturing process, NEO Battery enables longer-running and ultra-fast charging batteries compared to existing state-of-the-art technologies. The Company aims to be a globally-leading producer of silicon anode materials for the electric vehicle and energy storage industries. For more information, please visit the Company's website at: https://www.neobatterymaterials.com/.

On Behalf of the Board of Directors
Spencer Huh
Director, President, and CEO

For Investor Relations, PR & More Information:
info@neobatterymaterials.com
T: +1 (437) 451-7678

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