Docket #: S25-343

Multi-Doped Coating Materials for Lithium-Based Batteries

Stanford researchers have developed protective coating materials that can improve the stability, safety, and lifetime of lithium-ion batteries. The coatings are designed to protect battery components during repeated charging and discharging while still allowing lithium ions and electrons to move efficiently. This coating forms a thin barrier layer, built from a lithium ternary oxide host doped with a tailored combination of cations and anions, that shields the electrode surface while still conducting both electrons and lithium ions across it. The dopants are selected computationally to tune this balance of protection and conductivity for the specific host material and application. This approach could help battery manufacturers improve cycle life, safety, and long-term reliability in applications such as electric vehicles, consumer electronics, and grid storage.

Stage of Development:*Proof of Concept*

Applications

- Lithium-ion battery cathode and anode coatings
- Electric vehicle batteries
- Grid and stationary energy storage
- Solid-state battery interfaces
- Battery separator and current collector coatings

Advantages

- Combined cation-and-anion doping for tunable protection and conductivity
- Compatible with atomic layer deposition for atomistic precision
- Also compatible with lower-cost solution-based deposition

- Reduces capacity fade, transition-metal dissolution, and interphase growth
- Adaptable host chemistry and deposition method for different battery designs

Innovators

- Yunha Jung
- Friedrich Prinz
- Turgut Gur
- Hyun Soo Han
- Jonathan Mueller
- Sachin Ragaswamy

Licensing Contact

David Mallin

Licensing Manager, Physical Sciences

Email