In-situ polymerized and crosslinked electrolytes

Invention Reference Number
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This invention introduces a new concept of doped copolymer electrolytes for the next generation battery. These electrolytes can be polymerized and cross-linked in direct contact with electrodes for both lithium and sodium batteries. They exhibit high conductivity and transport number, good adhesion to electrodes, mechanical robustness, and high electrochemical stability. Lithium batteries using these electrolytes demonstrate high charging rates and good capacity retention, making them suitable for current market needs. This concept opens new avenues for designing high energy density batteries with fast charging and long duty cycles.

Description

This invention introduces a new concept of in-situ polymerized and crosslinked electrolytes designed to enhance battery performance by improving stability, safety, and efficiency. The resulting polymer electrolytes ensures strong adhesion and good electrical contact to electrodes while maintaining flexibility and durability. This design enables efficient ion transport, reduces interfacial resistance, and improves overall battery performance. Unlike traditional liquid or ceramic electrolytes, this material is more stable, preventing common issues such as leakage, fire hazards, and brittleness. It directly addresses key challenges faced by conventional electrolytes, including, poor adhesion, slow charging, and short battery lifespan.

Benefits

- Supports high battery charging rates
- Improved safety and stability
- Adheres well to electrodes, reducing performance loss
- Flexible and durable, making it suitable for various battery applications
- Scalable, cost-effective, and compatible to existing battery manufacturing

Applications & Industries

- Consumer electronics: Supports safer, longer-lasting batteries for phones, laptops, and wearables.
- Industrial and aerospace uses: Offers a durable solution for high-performance battery needs.
- Electric vehicles: Helps improve battery performance and longevity.

Contact

To learn more about this technology, email **partnerships@ornl.gov** or call 865-574-1051.