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SOLID POLYMER LITHIUM-ION BATTERIES

ENERGY

Nanocomposite solid polymer electrolytes to improve lithium-ion battery performance and safety.

TECHNOLOGY TYPE

Energy Storage
Lithium Ion Battery

STAGE OF DEVELOPMENT

- Prototypes constructed.

Demonstrates that high-performance solid polymer electrolytes can be manufactured in open air.

- Testing required to confirm safety and performance in extreme conditions.

IP PROTECTION

Nationalized PCT Pending in the United States

Composite Solid Electrolytes for Lithium Batteries
WO2017161160A1

Additional PCT Filed

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Reference Numbers: U-6104,
U-6262, U-6496

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TECHNOLOGY SUMMARY

Conventional lithium-ion batteries provide satisfactory performance, but using liquid electrolyte creates the potential for solvent leakage and flammability hazard which has created safety and reliability concerns. Use of a solid polymer electrolyte would improve safety, but solid electrolytes often do not meet performance requirements due to low ionic conductivity at lower temperature.

These new lithium-ion batteries utilize high performance nanocomposite solid polymer electrolytes (SPE) to improve safety and reliability. This new solid polymer electrolyte integrates low cost nanocomposite additives to allow high ionic conductivity at low temperatures, increased stability, and is pliable and moldable. Very positive test results have been obtained with the new SPE for use in lithium-sulfur, lithium-silicon, and lithium-iron phosphate batteries. The new batteries can be used for energy storage, electric vehicles, portable electronics devices, sensors, and other applications.

FEATURES AND BENEFITS

- Improves overall battery performance and cycling performance.
- Increases safety and stability.
- Exhibits high ionic conductivity at low temperatures.
- Utilizes a natural, economical, and non-toxic nanotube material.
- Simple technological process.
- Nanotube additive is under \$10 per pound, much less than carbon nanotubes or silicon nanoparticles at over \$15,000 per pound.

RECENT PUBLICATIONS

Lin, Y., Wang, X., Liu, J., Miller, J.D. (2017). Natural halloysite nano-clay electrolyte for advanced all-solid-state lithium-sulfur batteries. *Nano Energy*, 31:478–485. doi: [10.1016/j.nanoen.2016.11.045](https://doi.org/10.1016/j.nanoen.2016.11.045)

INVENTOR PROFILE

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