

Potassium-Ion Battery -- An alternative to the lithium-ion battery

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- Chemical Engineering
- Materials and Manufacturing

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- Batteries
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- earth abundant batteries
- Energy Storage
- grid storage
- inexpensive batteries
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- potassium batteries

The demand for lithium-ion batteries (LIBs) has soared over the past decade and continues to climb. For instance, the market for grid energy storage, a prime application of LIBs, is expected to grow from \$1.04 billion in 2013 to approximately \$28 billion by 2020. However, this is a problem due to the rising prices of increasingly scarce lithium metal. Safety also remains a primary concern of lithium ion batteries. Thermal runaway can initiate from exothermic breakdown of the solid electrolyte interphase (SEI) layer on carbon anodes. LIBs must be carefully designed and regulated for safe operation, leading to manufacturing cost increases.

Previously, researchers at Purdue University had developed an alternative to the lithium-ion battery. The new technology focused on the development of electrochemically active materials and chemical structures for potassium-ion batteries (KIBs). KIBs demonstrate greater promise than sodium-ion batteries due to electrochemically active sodium-containing materials being theoretically capable of less gravimetric capacities than potassium-containing materials. Despite the exceptional electrochemical performance, no prior studies have been reported regarding KIB carbon anode safety to evaluate the practicality of the battery system. Further experimentation by Purdue University researchers have shown that KIBs display increased safety and improved thermal runaway behavior. This development will help in the creation of commercially viable KIBs, which will help provide inexpensive and efficient energy storage alternatives to LIBs.

Advantages:

- Potassium is more abundant and less expensive than lithium
- Capable of same energy storage efficiency
- Capable of grid storage application
- Holds more promise than other alternatives

Potential Applications:

- Laptop batteries
- Mobile device batteries
- Grid energy storage systems

People:

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