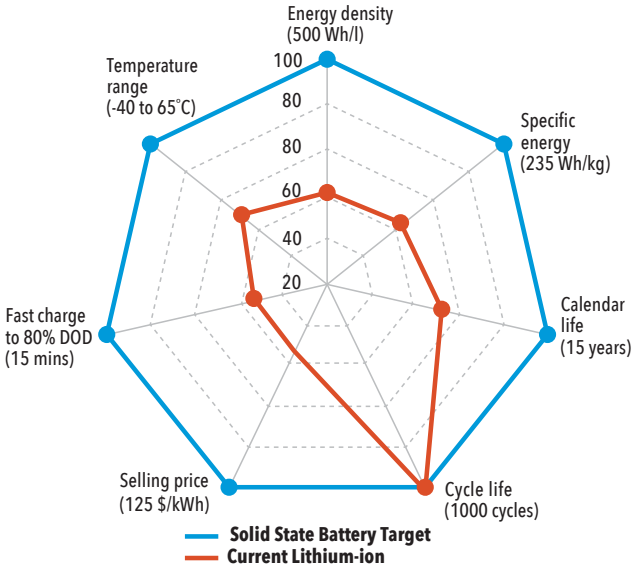
NRC·CNRC

SOLID-STATE BATTERIES

Next generation materials



The NRC's project team consists of senior researchers who specialize in polymeric and composite electrolytes, process development, and scale-up and additive manufacturing of ceramics and their composites, battery assembly, testing and validation.

MATERIAL DEVELOPMENT

One of the more promising energy storage technologies under development is solid-state lithium batteries because they offer higher energy density, and most importantly, increased safety compared to conventional liquid electrolyte-based batteries. However, the development of this technology has been hampered by the low ionic conductivity, brittle mechanical properties, and chemical instability of the solid electrolyte.

Several solid electrolyte chemistries have been investigated and have shown practical ambient temperature ionic conductivities equivalent to organic liquid electrolytes presently used in lithium-ion batteries. However, due to the strong ionic character of these oxide or sulphide-based materials, they, like most ceramics and glasses, are fragile, brittle and hard to formulate into the required thin film geometries.

OUR APPROACH

The objective of the project is to design and synthesize composite materials with greater flexibility and chemical stability along with processes for fabrication and validation to enable the next generation solid state batteries.

The NRC, along with its academic and industrial partners, are working on the development of the next generation of materials based on composites of existing and novel materials with less ionic and more covalent characteristics that can be combined with polymers to make more malleable and highly conductive solid-state electrolyte materials.

This project will screen groups of these materials to ensure they meet the criteria for performance, safety and manufacturability. Additional work on a variety of novel electrolytes, including covalent lithium-ion conducting materials, will be carried out in parallel and screened in coin-type lithium cells with various anode and cathode materials to ensure the stability of the entire material system. It is expected that together these activities will contribute to enhanced performance and safety for lithium-based batteries of the future.

CONTACT

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