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FAQs: *Tellurium Boosted Li-S Batteries for Zero-Emission Vehicles* project

What is the BC government's involvement in the project?

The PICS Opportunity Projects Program call for proposals in 2020 included an opportunity for a zero-emission vehicle (ZEV) project. The BC Ministry of Energy, Mines and Low Carbon Innovation has provided $180,000 in funding for this project through the province's CleanBC Go Electric program, which is designed to encourage and accelerate the adoption of ZEVs for environmental and economic benefits. The research is led by the University of British Columbia (UBC) in partnership with industry.

What are the project goals?

The *Tellurium Boosted Li-S Batteries for Zero-Emission Vehicles* project is developing a high-energy-density rechargeable lithium tellurium-sulfur (Li-TeS_x) battery to extend electric vehicle (EV) driving range and improve safety. The overall goal is to electrify the transportation sector through battery materials innovation, and grow capacity for a made-in-BC battery production and recycling industry.

What are the limitations of conventional EV lithium-ion batteries?

Rechargeable lithium-ion batteries face limitations of energy density (200-250 watt-hour per kilogram(W-h/kg)) and safety risks due to the flammable liquid electrolytes used. This project aims to deliver a 400 W-h/kg solid state Li-TeS_x battery cell that is smaller, safer and cheaper to manufacture due to the lower cost materials.

What is tellurium, and why combine it with sulphur?

Tellurium (Te) is a chemical element with high electronic conductivity and high volumetric capacity which could enable greater energy storage and faster charging/discharging than existing rechargeable lithium-ion batteries. Te has 30 times the electrical conductivity of sulphur, which is itself emerging as a promising component of next-generation batteries due to its delivery of high energy density despite its electrical conductivity limitations.

What are the challenges?

Tellurium tends to expand and contract leading it to pulverize other active materials where they are combined. The researchers believe that problem can be overcome by creating a stable compound combining sulphur, tellurium, and carbon for the battery cathode. Lithium is used for the anode.

Where can tellurium be sourced in Canada?

While tellurium is relatively rare in the Earth's crust it can be recovered as a by-product of the copper and lead-zinc smelting process. Canada is among the world's leaders in tellurium production, with at least three firms engaged in tellurium production in British Columbia.

How does this project support climate solutions?

If technologically successful, this project will accelerate transportation electrification and the shift to decarbonized energy. This work will also promote the upgrade of industrial wastes into high-value-added products for high-end applications. The intent is that tellurium will be recovered from end-of-service tellurium batteries and used again. Other potential applications include energy storage for solar and wind power.

What are the potential economic spinoffs?

The global market for lithium-ion batteries is expected to grow exponentially over the next few decades. This project aims to strengthen industry battery-supply-chain and product competitiveness in Canada. This includes expansion of R&D battery technology capacity in BC, raw material recycling and job creation.