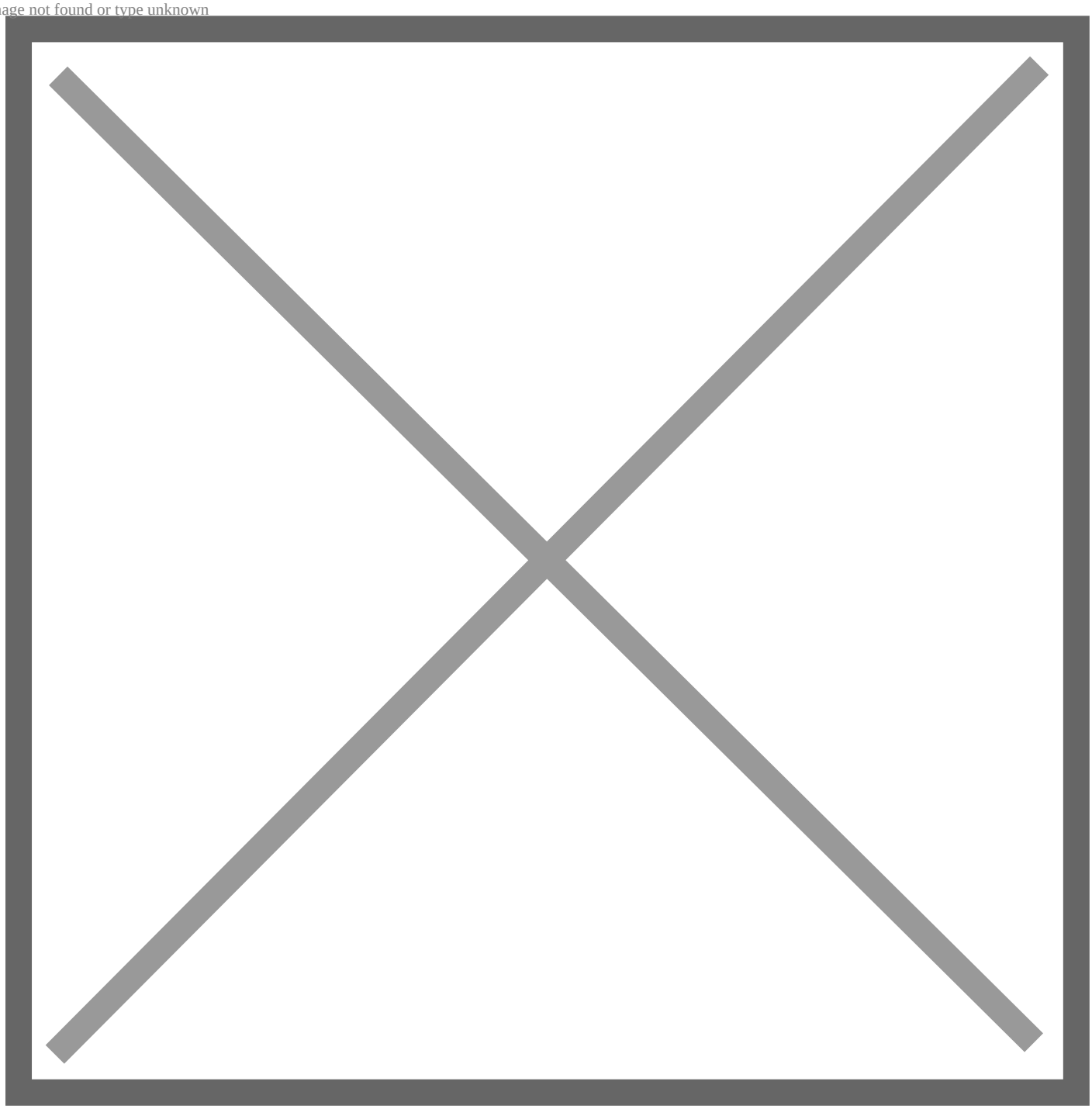
Toyota Selected to Receive $4.5 Million in Federal Funding for Development of Technology to Support a Circular Domestic Supply Chain for Electric Vehicle Batteries

December 18, 2024

Image not found or type unknown



ANN ARBOR, Mich. (Dec. 18, 2024) – Toyota announced today that Toyota Engineering & Manufacturing North America, Inc. (TEMA), inclusive of Toyota Motor North America (TMNA) R&D, has been selected to receive $4.5 million in funding from the U.S. Department of Energy, Advanced Research Projects Agency-Energy (ARPA-E). The funding is part of the Catalyzing Innovative Research for Circular Use of Long-lived Advanced Rechargeables (CIRCULAR) Program, designed to support a circular domestic supply chain for electric vehicle (EV) batteries.

TEMA's Toyota Research Institute of North America (TRINA) division will administer the project – Development of an Autonomous Robotic Disassembly Process for Applications in Battery Pack Circularity – in collaboration with Oak Ridge National Laboratory (ORNL), National Renewable Energy Laboratory (NREL)

and Baker Hughes' inspection technology product line, Waygate Technologies to pursue the project goals.

This project aims to develop an industry-relevant template for a 3R (Reduce, Reuse, Recycle) facility of the future. The goal is to help resolve the primary bottlenecks in current battery supply chain circularity, which are the automation of battery pack disassembly, data-driven battery classification, and addressing cell degradation.

In support of this goal, the teams working on the project will develop tools and procedures. They will include an automated pack disassembly process, advanced diagnostic tools and protocols for module and cell 3R classifications, and a refabrication method for 3R cells into new energy systems. Together, these innovations envision a scenario where end-of-life lithium-ion batteries are systematically evaluated, classified and reused prior to being considered for recycling.

"As it stands, this project and program will highlight avenues for everyone to rethink their approach to battery circularity, and help prioritize the extension of battery life, facilitate battery reuse, and reduce battery waste while unveiling the appropriate pathways to achieve such priorities," said Nik Singh, principal scientist at TRINA who is Principal Investigator on this project. "This is only made possible by the collaboration between the exceptional teams comprised within this project group."

The concepts developed within this project will also be applied in industrial settings led by TMNA's Battery Lifecycle Solutions (BLS), Business Development Team.

"This collaboration represents a significant step forward in developing sustainable solutions for the battery lifecycle", said Sarah Kennedy, BLS manager who is leading the technology to market deployment. "By applying the innovations established from this project, we aim to create a framework that not only reduces battery waste but also enhances the circularity of our battery supply chain, supporting Toyota's commitment to sustainability and mobility."

As end-of-life and battery scrap volumes increase in the coming years, a new approach is needed to extend the useful life of many standard battery pack components, and conserve their initial techno-economic investments, paving the way for a more sustainable, circular battery supply chain.

"We will generate processes to streamline reusing and refurbishing valuable battery cells and modules from end-of-life packs, without having to scan every single battery pack every single time," said Marm Dixit, who is co-leading ORNL's contributions to the project. "By extending the life of the battery components, we reduce their total emissions per mile. That's a big deal for the role EVs can play in the energy transition."

"NREL's expertise in advanced electrochemical analysis using machine learning and imaging using nano computed tomography will enable rapid assessment of state of health, remaining useful life and failure mode of end-of-life Toyota cells, modules and pack," said Ankit Verma, NREL staff scientist.

"This research partnership underlines our position as an inspection technology leader in the field of non-destructive testing," commented Neil Bloomfield, global battery segment leader for Waygate Technologies at Baker Hughes, which will primarily provide state-of-the-art computed tomography and ultrasonic systems for battery inspection. "With this project, we are honored and committed to actively contribute to the energy transition, which is an integral part of our company's strategy."