Mali solid-state batteries

Oak Ridge National Laboratory is managed by UT-Battelle LLC for the US ...

Understanding the heat generation mechanisms and the interplay between ...

Mahalingam Balasubramanian is a Distinguished Scientist and Group ...

Mali Balasubramanian made a rewarding mid-career shift to focus on studying new battery materials and systems using X-ray spectroscopy and other methods. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

Having passed the midpoint of his career, physicist Mali Balasubramanian was part of a tight-knit team at a premier research facility for X-ray spectroscopy. But then another position opened, at the Department of Energy"s Oak Ridge National Laboratory -- one that would take him in a new direction.

"I was really at a crossroads," said Balasubramanian, who was enjoying his research and colleagues at the DOE"s Argonne National Laboratory. "I loved the work there. But I also liked battery science and wanted to explore something different: being involved directly in programmatic science."

So after 18 years on one path, he took a left turn to become leader of ORNL"s Emerging and Solid State Batteries Group in the Energy Science and Technology Directorate. He guides his team in exploring potential new materials and systems for electric vehicle and other batteries.

Batteries operate by the movement of ions between positively and negatively charged electrodes separated by an electrolyte. Balasubramanian and his group work on problems such as finding effective, earth-abundant materials for the positive electrode and methods for manufacturing solid electrolytes, which could enhance battery safety while reducing their size.

Balasubramanian chose his new direction partly because his professional experiences had demonstrated how refreshing new viewpoints could be. Collaborating across scientific fields was a hallmark of his job at a DOE circular particle accelerator, the Advanced Photon Source, or APS. Balasubramanian helped visitors from around the globe study how the X-rays interact with matter. His collaborations fed each other, with prolific results: He has authored more than 275 publications, which other scientists have cited more than 16,000 times.

"I"ve always done my best work with others," he said. "I was excited by the people here at ORNL. It"s always the people that are important."

Shining a light on materials

Balasubramanian"s father, a chemist at an ordnance factory in the south of India, sparked his son"s interest in science. Balasubramanian recalls being around age 8 when his dad explained heavy water and the structure of glucose, conveying obvious excitement about what chemistry could do and reveal. "Dad was an inspiration for me and my sister," Balasubramanian said. "We both became scientists."