

ARGONNE BATTERY TECHNOLOGY HELPS POWER CHEVY VOLT



A Chevy Volt at a charging station. Its battery is based on a cathode technology, developed at Argonne National Laboratory, which makes the battery safer, longer-lived, and more powerful. Photo Courtesy of General Motors and U.S. Department of Energy

PARTNERS

Argonne's cathode technology has been licensed to General Motors Co.; LG Chem, Ltd.; BASF; Envia Systems; and Toda Kyogo.

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MORE INFO

<http://www.anl.gov/articles/argonne-battery-technology-helps-power-chevy-volt>

TIMELINE

In the late 1990s, the U.S. Department of Energy's Office of Basic Energy Sciences funded an intensive study of lithium-ion batteries. Argonne developed and patented cathode material technology in lithium-ion battery cells. LG Chem licensed the technology from Argonne in 2011 and used the materials to create the battery supplied for the Chevy Volt. GM has also licensed the technology for its own tests.

CONTACT

Communications and Public Affairs
E-mail: media@anl.gov

Intense X-rays from the U.S. Department of Energy Office of Science's Advanced Photon Source (APS) at Argonne National Laboratory were used to help Argonne design the technology used in the battery cell that powers General Motors Company's Chevrolet Volt. This plug-in hybrid electric vehicle has a range of 53 pure electric miles and up to 420 miles with a full charge and a full tank of gas.

APS X-rays were crucial for designing the Volt's improved battery cathode by enabling scientists to see for the first time at the atomic level the molecular structure of battery material.

Scientists were able to watch chemical reactions as they occurred in the lithium battery, yielding information needed to start modifying and optimizing the cathode materials. Using new synthesis methods, lithium- and manganese-rich materials were created that proved much more stable than those found in existing designs.

IMPACT

Argonne's breakthrough cathode material helped enable the Chevy Volt, the first mass-produced plug-in electric vehicle.

The Argonne-developed technology offers the longest-lasting energy available in the smallest, lightest package: a 50-100% increase in energy storage capacity over conventional cathode materials. Its unique lithium- and manganese-rich mixed-metal oxide combination extends the operating time between charges, increases calendar life, and improves the inherent safety of lithium-ion cells.

Because the cathodes design is more stable than those traditionally used in batteries, the new batteries are safer and less likely to overheat. Manganese is inexpensive, so the battery costs less to manufacture. The upper charging voltage limit also increased to 4.6 volts—higher than the usual operating voltage—creating a tremendous jump in energy capacity.