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A New Low-Cost, Environmentally-Friendly Technology is Set to Change the Cooling and Refrigeration Industries

RICHMOND, Virginia – (date) –

Virginia Commonwealth University researchers have developed a material for the improvement of cooling systems that manufacturers can take advantage of to improve cooling capabilities by up to 30%. And the best part? It's also environmentally safe.

This technology is based on the thermodynamic correlation of reversible change in magnetic entropy, and is known as magnetocaloric cooling.

To put it simply, magnetocaloric materials heat up in a magnetic field, then cool down again when that magnetic field is removed. This technology can be used to achieve extremely low temperatures, as well as the temperature ranges required in common refrigerators, air conditioning units, and many other applications.

"Magnetocaloric refrigeration isn't that new," says Everett Carpenter, one of the inventors at VCU. "However we were able to produce the materials in a unique way to improve the efficiency and usability compared to other magnetocalorics."

That technology uses a well-established manufacturing method to produce LCMO pellets that increase efficiency by 30% compared to traditional gas compression.

Brent Fagg, VCU Licensing Associate, says one of the benefits of magnetocaloric refrigeration is that it's not dependent on harmful CFCs and HFCs present in most cooling systems.

“Magnetocaloric technology is designed to remove heat from systems without the need for gas pollutants used in traditional systems,” says Fagg. “Which means this technology will be extremely beneficial to reducing our environmental impact.”

“LCMO,” says Carpenter, “isn’t typically thought of as having a high magnetocaloric effect. Yet once the material was processed using our method, it exhibited a very high change in magnetic entropy.”

According to Carpenter, LCMO improves upon existing magnetocalorics further by having an operational range near room temperature, using cheaper materials, and being better able to disburse heat.

This technology can be used in a number of areas, including refrigeration, home/business cooling, solid state cooling, data center cooling, and computer cooling, to name a few.

According to Fagg, it can also be readily incorporated into existing systems, and easily transitioned into the marketplace. Which means businesses and consumers can soon enjoy better energy efficiency with less harm to the environment.

“We’re currently working with commercial partners to help us identify all of the ways we can use this technology,” says Fagg. “Of course, we welcome any help we can get in that area.”

About VCU and the Magnetocaloric Technology

This new method was a collaborative effort between the VCU Nanomaterials Core Characterization Facility and the VCU Department of Chemistry Instrumentation Facility. Inventors/researchers who developed the technology include Everett Carpenter, Ahmed El-gendy, and Melissa Tsui.

Research Link: Enhanced Near Room Temperature Magnetocaloric Effect in La_{0.6}Ca_{0.4}MnO₃ for Magnetic Refrigeration Application