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The New Cool: LSU Physicist Discovers New Material Set to Change Cooling Industry

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BATON ROUGE – Refrigeration and air conditioning may become more efficient and environmentally friendly thanks to the patent-pending work of LSU physicists. The team of researchers led by LSU Physics Professor Shane Stadler has discovered a breakthrough magnetocaloric material that may change the energy industry, including air conditioning and food refrigeration.

"The world refrigeration market is expected to increase by about $7-8 billion by 2018," Stadler said. Therefore, his breakthrough has a significant economic impact as well as an impact on the energy industry and environment.

Stadler's research focuses on the next generation of magnetic cooling technologies, which are simpler in design, quieter and more environmentally friendly than conventional compressed-gas systems currently used.

"LSU's basic research into low temperature physics and materials science has potential applications in areas related to energy, electronics and the environment," said Michael L. Cherry, chair and professor, LSU Department of Physics and Astronomy. "Professor Stadler's magnetocaloric materials program is an example of this research that appears to be directly relevant to energy development and Louisiana's economy. It also provides excellent training opportunities for Louisiana's students."

In this new technology, a magnetic field magnetically orders the material at ambient temperature, which raises its temperature above ambient. The excess heat is removed through a thermal medium, such as water or air, bringing the material back to ambient temperature. The

magnetic field is then removed, the material becomes magnetically disordered and its temperature drops below ambient temperature leading to a cooling effect. This "solid state" cooling process is significantly more energy efficient than the conventional, compressed gas systems currently on the market today.

"We've studied these systems for a long time, and were fortunate to discover a system in which a magnetic transition coincided in temperature with a structural transition," Stadler said. "That this magnetostructural transition occurs near room temperature is what makes it a strong candidate for magnetocaloric cooling devices of the future."

Stadler's team's technological discovery is a promising alternative for refrigeration and air conditioning that can reduce the use of harmful gas fluorocarbons.

"We are excited about the potential applications that are available for Dr. Stadler's technology," said Andrew Maas, assistant vice president for research over technology transfer and director of the renamed Office of Innovation and Technology Commercialization. "The Department of Energy, General Electric and other companies around the world have been working with magnetocaloric materials for some time. Dr. Stadler's solution addresses many of the issues that these big players have encountered."

Currently, a local group of entrepreneurs have expressed interest in this advanced technology. After further testing, they will look into developing commercialization opportunities utilizing it for the heating and cooling industry.

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