Press release

Fraunhofer spin-off

Qurie, a Freiburg-based startup, is entering the market with caloric cooling technology

A team led by researchers from the Fraunhofer Institute for Physical Measurement Techniques IPM has developed a new technological concept that is expected to transform the cooling systems market. Founded in 2026, Qurie GmbH develops solid-state heat pumps based on electrocaloric materials.

Heat pumps have increasingly drawn public attention in the wake of the heating transition. The basic principle behind these pumps was first invented in the early 19th century. Since then, heat pumps have been used to cool or heat by compressing and vaporizing a refrigerant in a closed loop. All standard refrigerators operate on this principle. Qurie GmbH, a spin-off from the Fraunhofer Institute for Physical Measurement Techniques IPM in Freiburg, aims to revolutionize future heat pump technology with a fundamentally new concept. Using caloric materials, heat pumps can be built without a compressor. This offers many advantages. While compressor-based heat pumps can only reach 50 percent of the possible thermodynamic efficiency, caloric systems can theoretically exceed 80 percent. This results in potential savings of about 40 percent in operating power. Caloric heat pumps do not require harmful refrigerants, run quietly, require little maintenance, and can potentially be produced more cost-effectively.

Initial target markets: control cabinet and laser cooling

For over ten years, Fraunhofer IPM has been conducting research on electro-, magneto-, and elastocaloric heat pumps. With Qurie, the institute's researchers are entering the market with a focus on electrocaloric cooling technology. Electrocaloric heat pumps use the temperature change of a solid-state material under the influence of an electric field to establish a cooling cycle. Compared to magneto- or elastocaloric materials, the system design is simple, as neither magnets nor actuator systems are required. Fraunhofer IPM is bringing one of its key innovations to the startup: a globally patented concept for heat dissipation based on active electrocaloric heat pipes (AEH). AEH enable rapid latent heat transfer through the evaporation and condensation of a fluid, such as ethanol or water, on the caloric material. "With our heat pipe approach, we dissipate heat very efficiently within the system and can thus achieve significantly higher pump frequencies than were previously possible with heat transport via liquids," says Dr. Kilian Bartholomé, Group Manager at Fraunhofer IPM and one of the founders of Qurie, alongside Dr. Christian Vogel. Thanks in part to this core innovation, the young company, which currently has six employees, sees itself in a strong position compared to alternative system concepts for electrocaloric cooling systems. Qurie's first target markets are control cabinet and laser cooling. Building on these niche markets, the company plans to

subsequently develop electrocaloric systems for commercial cooling and, later, for the consumer market.

In April, a seed funding round took place with High-Tech Gründerfonds (HTGF), the Technology Transfer Fund TT49 of the European Investment Fund (EIF), and Aepikur GmbH. Development work will be supported in parallel with the company's launch until the end of 2026 as part of a research program funded by the Federal Ministry for Economic Affairs and Energy.

How does an electrocaloric heat pump work?

When an electric field is applied to electrocaloric materials, the electric dipole moments align within the field. According to the laws of thermodynamics, this increased order causes the material to heat up. The resulting heat is dissipated via a heat sink, which allows the material to cool back down to its initial temperature. When the electric field is removed, the order decreases, causing the material to cool down, again in accordance with the laws of thermodynamics. The material can then absorb thermal energy from a heat source. The effect is reversible. This allows a cycle to be established that functions as an efficient heat pump for cooling or heating.

Ready to begin developing electrocaloric heat pumps in May: The founding team of Qurie GmbH in front of their newly occupied laboratory and office space in the Haid industrial park in Freiburg. The team is led by Dr. Kilian Bartholomé (left) and Dr. Christian Vogel (second from right).

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