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**PRINCIPLES OF SOLID-STATE COOLER ON LAYERED
MULTIFERROICS**

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ABSTRACT

We summarize the main physical ideas behind the development of the novel solid-state cooling system. The main strategy relies on strengthening of the electrocaloric effect. We show that for practical realization additional piezoelectric layers or new multiferroic materials can be used. Moreover, a combination of the electrocaloric effect and an external force is very promising. This force can be either the magnetic field or the mechanical stress. The proposed concept is supported by experimental data and theoretical calculations. Further progress in the development and use of solid-state coolers operating on the basis of the caloric effect depends largely on the creation of novel (e.g. multiferroic) materials for which the caloric effect depends not only on the basic physical quantities (temperature and electric field for the ECE), but also on any other additional parameter (magnetic field, mechanical stress, and *etc*).

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