

# The giant electrocaloric effect: phenomenon for application in cooling and heating devices of new generation

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Electrocaloric effect (ECE) is a change in the temperature of electrocaloric material due to the applied electrical field under adiabatic conditions, and it generates great interest due its application in new generation cooling or heating devices, which would be friendlier for environment.

Recent predictions of the existence of the giant ECE in inorganic ferroelectrics are based solely on the indirect measurements of the electrical polarization and not on direct measurements of the ECE itself [1]. In our case, this effect was measured directly and the observed magnitude of ECE is consistent with recent predictions. We show direct measurements of ECE in PMN, PMN-30 PT, PMN-35 PT and in PLZT 8/65/35 ceramics [2]. Both bulk and thin films were measured.

The temperature dependence of ECE shows that the maximum ECE is achieved at the ferroelectric phase transition and the magnitude of ECE indicates that the giant ECE can be easily found in different classes of ferroelectric relaxors.

As we mentioned above, the ECE is very attractive phenomenon in a broad range of applications like actuators, sensors and also in heating and cooling devices, i.e. electrical refrigerator. Novel cooling elements could be made without moving parts and thus greatly simplifying the device configuration [2].

## Reference:

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