

## Antiferroelectric and Relaxor Multiferroics as Electrocaloric Coolants

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The electrocaloric (EC) effect has recently attracted significant interest for developing new heat-management devices that have the potential to replace the existing technologies [1,2]. In this contribution direct measurements of the large EC effect in antiferroelectric and lead-free ferroelectric materials [3,4] will be presented. Specifically, the negative EC effect in antiferroelectric n/95/5 PLZT and PBZ ceramics will be investigated by direct experiments. Here, it is demonstrated that both negative and positive EC response can be arbitrarily invoked in antiferroelectric materials by properly controlling the electric field and temperature. In addition, the large positive EC response observed by direct experiments in lead-free BCTZ-based ferroelectric materials will be reviewed.

### References:

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