

## Soft Caloric Materials for New Heat-management Technologies

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With increased environmental awareness, the search for an environmentally friendlier heat-management device has been the topic of many scientific studies. Materials with large caloric effects, such as the electrocaloric (EC) and elastocaloric (eC) effects, have the promise of realizing new solid-state refrigeration techniques. A review of recent direct measurements of the large EC effect in liquid crystals (LCs) and large eC effect in liquid crystal elastomers (LCEs) [1, 2] will be given in this contribution, including the application aspect. In particular, in smectic LCs and mixtures of LCs with functionalized nanoparticles, the EC effect exceeds 8 K and the eC in main-chain (MC) LCEs exceeds 2 K with the eC responsivity about three orders of magnitude larger than the average eC responsivity found in the best shape memory alloys. However, both soft materials can play a significant role as active cooling elements and parts of thermal diodes or regeneration material in developing new cooling devices.

### References

1. D. Črešnar et al, J. Phys. Energy 5: 045004, 2023.
2. A. Rešetič et al, Nat Comm 7: 13140, 2016.