Liquid Crystals as Active Electrocaloric Cooling Materials

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Materials with large caloric effect have the promise of realizing solid state refrigeration which is more efficient and environmentally friendly compared to current techniques [1]. A review of recent direct measurements of the large electrocaloric effect in liquid crystalline materials [2-4] will be given. In liquid crystalline materials and mixtures of liquid crystals with functionalized nanoparticles the electrocaloric effect exceeding 8 K was found in the vicinity of the isotropic to the smectic phase transition. Direct electrocaloric measurements indicate that the electrocaloric response is significantly enhanced by the latent heat [4]. Liquid crystalline materials can play a significant role as active cooling elements and parts of thermal diodes or regeneration material in development of new cooling devices.

References:

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