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Two phase multiferroics for voltage-induced entropy change with application in near-room-temperature refrigeration[1] PRAKASH GIRI, University of Nebraska - Lincoln, DHANANJAY KUMAR, North Carolina Agricultural and Technical State University, CHRISTIAN BINEK, University of Nebraska-Lincoln — The demand for environmental friendly, cost-effective and energy efficient cooling drives the emerging technology of magnetic refrigeration at room temperature. We fabricate a two phase mutiferroic $La_{0.7}Sr_{0.3}MnO_3/Pb(Mg_{1/3}Nb_{2/3})O_3$-$PbTiO_3$(001) via pulsed laser deposition for application in advanced near room-temperature refrigeration and miniature cooling devices. The key innovation rests on utilizing the magnetocaloric effect in zero applied magnetic fields. The magnetocaloric effect of the composite is activated purely by electric field. We utilize strain originating from stress which is voltage-induced via the inverse piezoelectric effect of PMN-PT. The strain is carried over into the adjacent LSMO thin film thus changing its magnetic order. The voltage-induced variation in magnetization leads to change in isothermal entropy when the experiment is carried out in contact with a thermostat and gives correspondingly rise to an adiabatic temperature change when heat exchange is suppressed.

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