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Colossal magnetocapacitance and scale-invariant dielectric response in mixed phase manganites RYAN RAIRIGH, AMLAN BISWAS, ARTHUR HEBARD, Dept. of Physics, University of Florida, Gainesville, FL 32611-8440 — We are studying thin-film capacitors utilizing $(La_{0.5}Pr_{0.5})_{0.7}Ca_{0.3}MnO_3$ (LPCMO) as the base electrode, AlOx as the dielectric and Al as the counter-electrode. The LPCMO films exhibit *colossal magnetoresistance* (CMR). Likewise, the capacitance changes by three orders of magnitude in the region of the resistance drop. These *colossal magnetocapacitance* (CMC) effects are related to magnetic field induced changes in the relative extent of coexisting ferromagnetic metal and charge ordered insulating phases. The widths of the hysteresis loops, in capacitance and resistance, are about the same, but the center of the capacitance loop is shifted 20 K below the center of the resistance loop. When the LPCMO resistance is at a maximum (low capacitance) the electrode comprises filamentary conductors threading an insulating medium. In this region log-log Cole-Cole plots reveal an intrinsic dielectric response in which the data plotted as a function of frequency (ω) collapse onto single straight lines, implying scale-invariance over a wide range of ω, magnetic field and temperature.

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