Electronic Supplementary Information

Simultaneous enhancement of magnetocaloric and magnetodielectric effect in MnCo$_2$O$_4$ spinels by varying Co/Mn ratio

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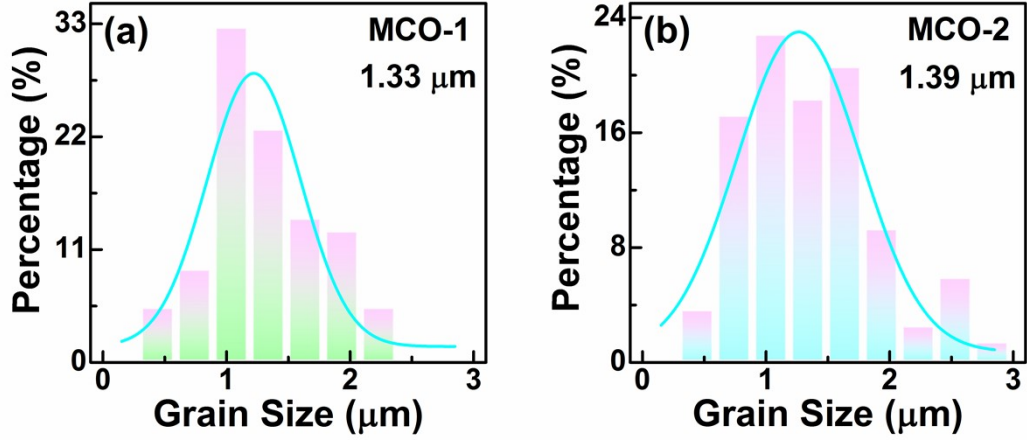
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Fig. S1 The grain size distribution of (a) MCO-1 and (b) MCO-2 ceramics.
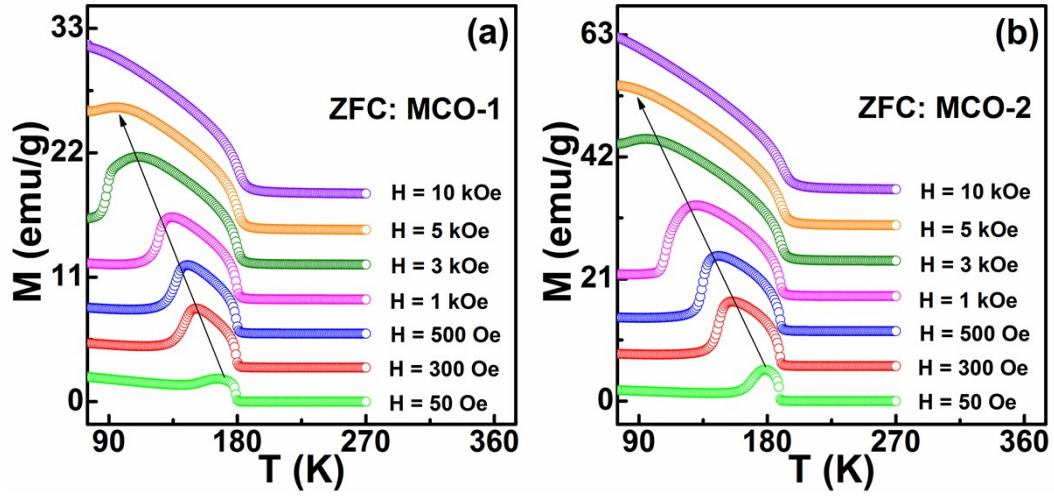

Fig. S2 Magnetization as a function of temperature measured at various magnetic fields under ZFC process for (a) MCO-1 and (b) MCO-2 ceramics.
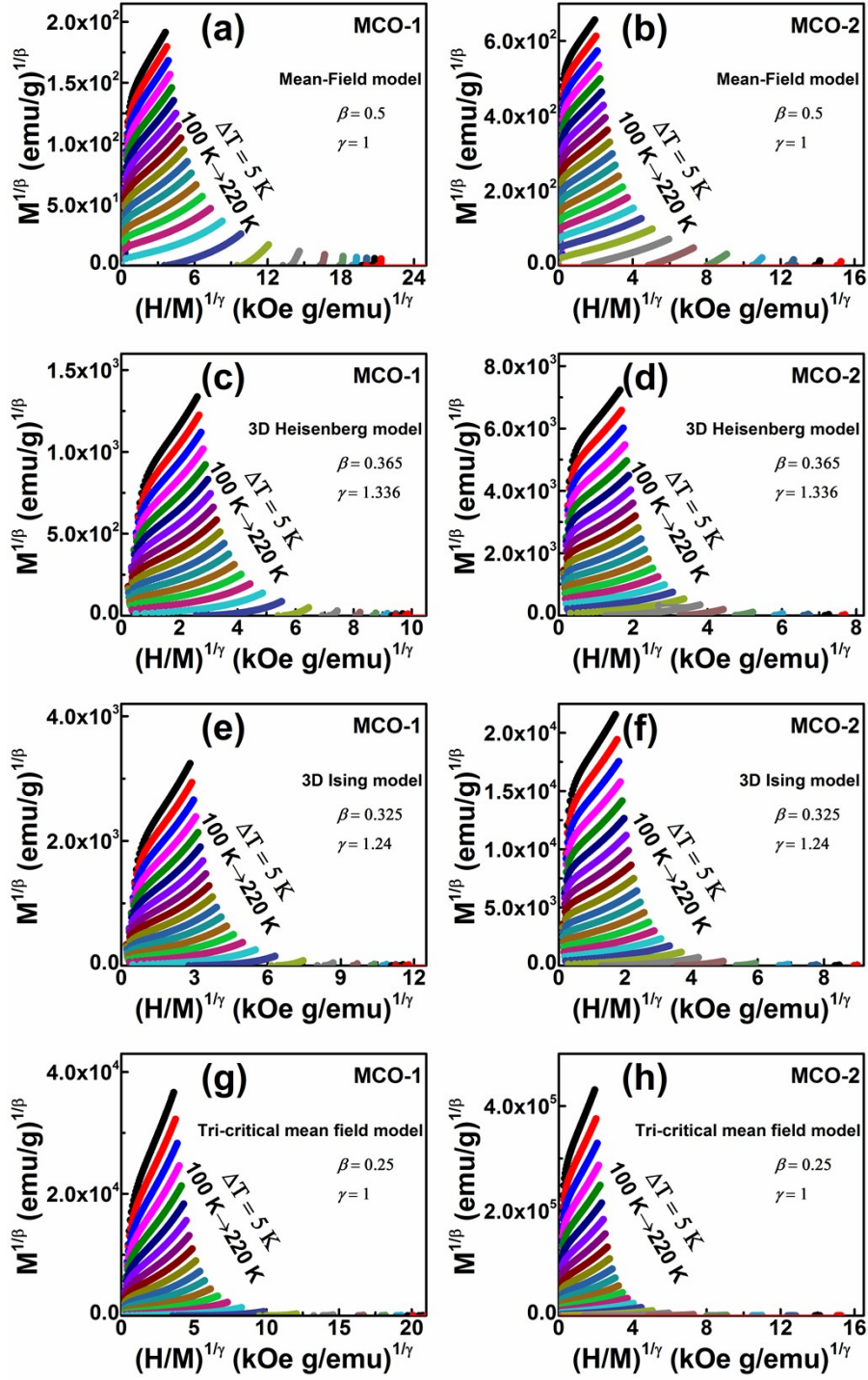
Fig. S3 Modified Arrott plots (MAP) with the (a)-(b) mean-field model (β=0.5, γ=1), (c)-(d) 3D Heisenberg model (β=0.365, γ=1.336), (e)-(f) 3D Ising model (β=0.325, γ=1.24), and (g)-(h) tri-critical mean field model (β=0.25, γ=1) for MCO-1 and MCO-2 ceramics, respectively.
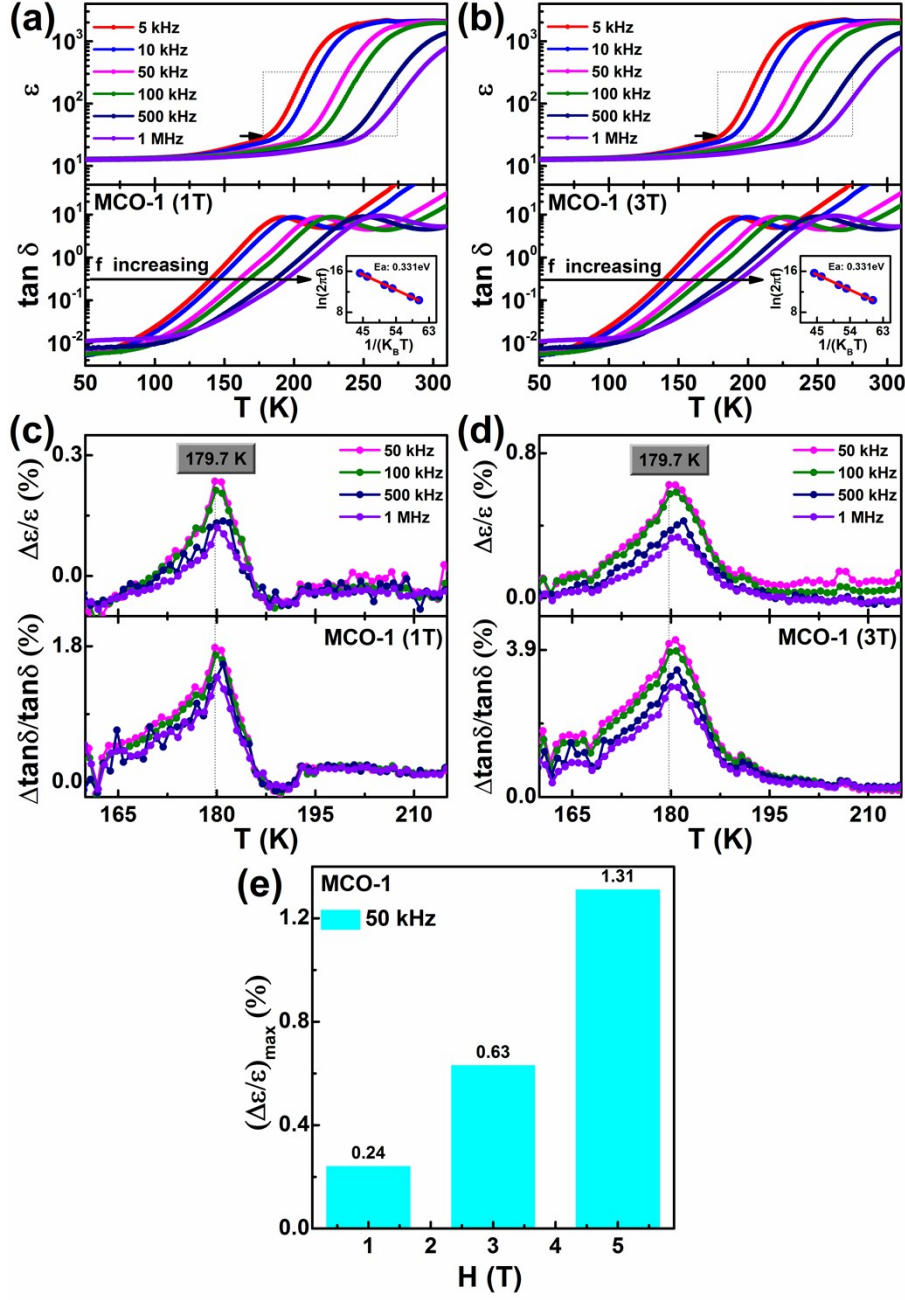
Fig. S4 Temperature dependent ε and tanδ of MCO-1 ceramics measured at various frequencies under (a) 1 T and (b) 3 T magnetic fields. The insets give the relation between $\ln(2\pi f)$ and $1/(k_B T)$ according to the Arrhenius law for dielectric relaxation in the temperature range of 190-270 K. (c)-(d) The corresponding variations of ε and tanδ for pure-MCO ceramics measured at various frequencies. (e) The comparison of the maximum values for $\Delta\varepsilon/\varepsilon$ (%) at 50 kHz.
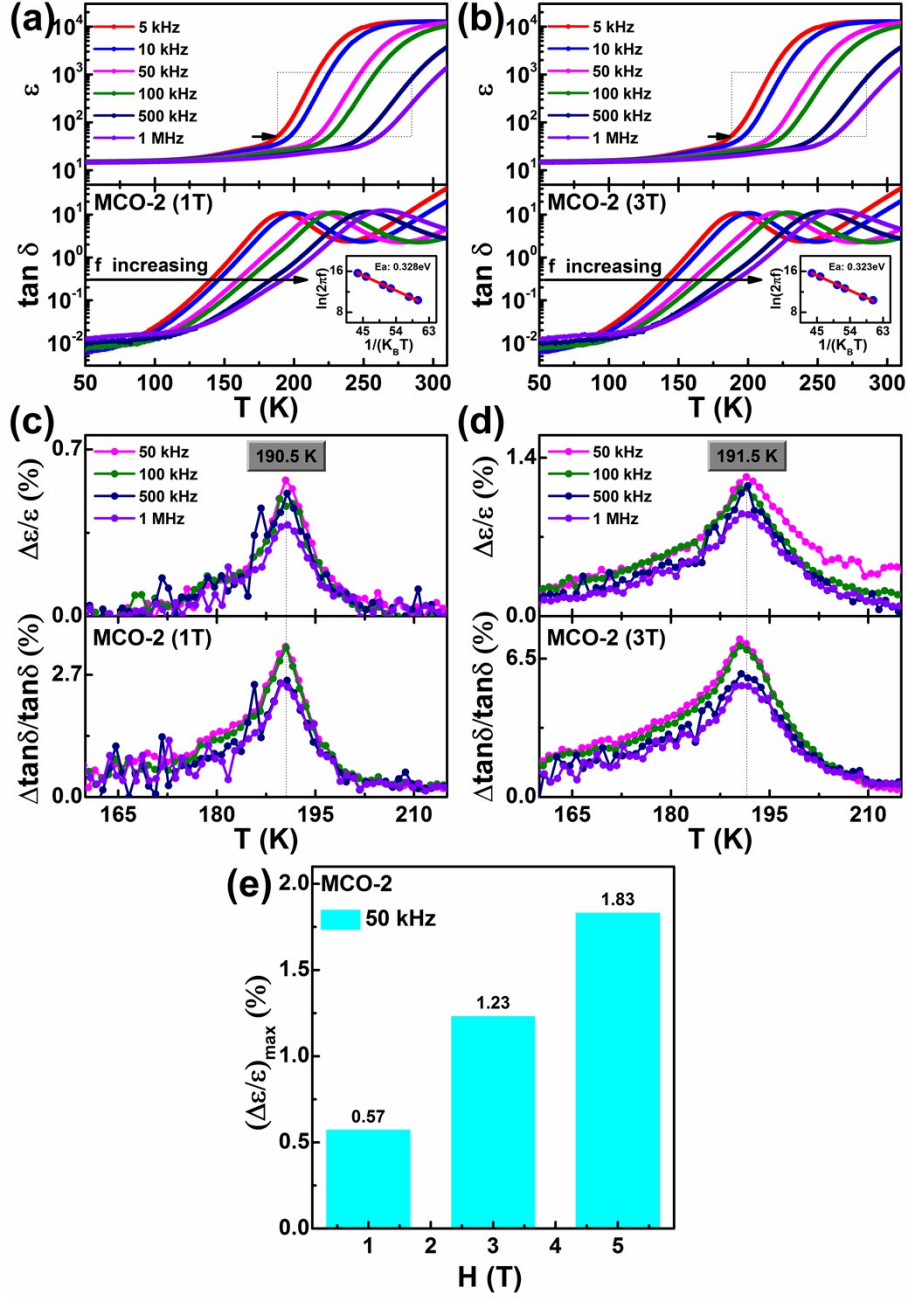
Fig. S5 Temperature dependent ε and tanδ of MCO-2 ceramics measured at various frequencies under (a) 1 T and (b) 3 T magnetic fields. The insets give the relation between ln($2\pi f$) and $1/(k_B T)$ according to the Arrhenius law for dielectric relaxation in the temperature range of 190-270 K. (c)-(d) The corresponding variations of ε and tanδ for doped-MCO ceramics measured at various frequencies. (e) The comparison of the maximum values for $\Delta\varepsilon/\varepsilon$ (%) at 50 kHz.