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Influence of Er doping on magnetic and magnetocaloric behavior of hexagonal $\text{Yb}_{1-x}\text{Er}_x\text{MnO}_3$ ($x = 0.1, 0.2, 0.3, 0.5, 0.7$ & 1.0) manganites

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Abstract:

The effect of substitution of Er at the Yb sites in YbMnO_3 on its magnetic and magnetocaloric is reported. All $\text{Yb}_{1-x}\text{Er}_x\text{MnO}_3$ ($x = 0.1, 0.2, 0.3, 0.5, 0.7$ and 1.0) samples show hexagonal structure with $P6_3cm$ space group as confirmed by powder X-ray Diffraction. The antiferromagnetic ordering temperature (Néel temperature, T_N) is observed to decrease from 86 K for $x = 0.1$ to 76 K for $x = 1.0$. All compounds show ferromagnetic (FM) ordering due to alignment of the Yb/Er moments below 4 K. A field induced transition is also observed in the isothermal magnetization measurements. The magnetic entropy change increased from 3.0 ± 0.3 to 4.5 ± 0.7 J/mole-K in a magnetic field of 100 kOe, whereas the Relative Cooling Power (RCP) changed from 52 ± 7 to 140 ± 3 J/mol under an applied magnetic field of 100 kOe, when x increased from 0.1 to 1.0.

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