

Reduction of hysteresis loss in $\text{LaFe}_{11.7}\text{Si}_{1.3}\text{H}_x$ hydrides with significant magnetocaloric effects

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Abstract Magnetic properties and magnetocaloric effects (MCEs) have been investigated in hydrogenated $\text{LaFe}_{11.7}\text{Si}_{1.3}\text{H}_x$ ($x = 0, 1.37, \text{ and } 2.07$) compounds. It is found that the Curie temperature, T_C , can be tuned from 192 to 338 K by adjusting the hydrogen content from 0 to 2.07. It is attractive that both thermal and magnetic hysteresis are remarkably reduced because of the weakness of the itinerant-electron metamagnetic transition after hydrogenation. The maximal hysteresis loss at T_C decreases from 33.4

investigate magnetic refrigerants having large MCEs in relatively low magnetic fields. Large MCEs in some magnetic materials have been reported. The rare-earth elements and their compounds such as Gd [1] and $(\text{Dy}_{0.5}\text{Er}_{0.5})\text{Al}_{12}$ [2] that have a second-order transition exhibit large MCEs. Recently, large MCEs have been observed in compounds having a first-order transition, such as $\text{Gd}_5(\text{Si}_2\text{Ge}_2)$ [3]. $\text{Gd}_5(\text{Si}_2\text{Ge}_2)$ exhibits $\Delta S_M = -18 \text{ J/kg K}$ for a magnetic field change from 0 to 5 T at the first-order crystallographic