

Accepted Manuscript

Research articles

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PII: S0304-8853(17)33030-5

DOI: <https://doi.org/10.1016/j.jmmm.2017.11.059>

Reference: MAGMA 63399

To appear in: *Journal of Magnetism and Magnetic Materials*

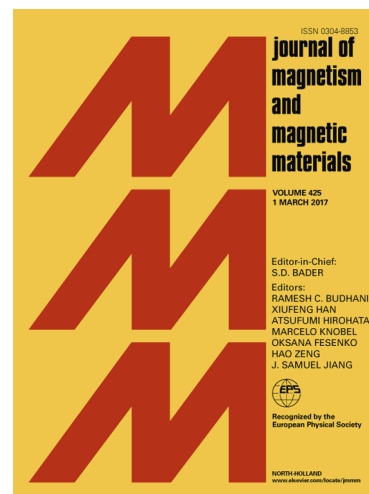
Received Date: 25 September 2017

Revised Date: 15 November 2017

Accepted Date: 15 November 2017

Please cite this article as: J. Yang, Y. Shao, Z. Feng, J. Liu, The effect of cooling rate on the phase formation and magnetocaloric properties in $\text{La}_{0.6}\text{Ce}_{0.4}\text{Fe}_{11.0}\text{Si}_{2.0}$ alloys, *Journal of Magnetism and Magnetic Materials* (2017), doi: <https://doi.org/10.1016/j.jmmm.2017.11.059>

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The effect of cooling rate on the phase formation and magnetocaloric properties in $\text{La}_{0.6}\text{Ce}_{0.4}\text{Fe}_{11.0}\text{Si}_{2.0}$ alloys

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Abstract: In this work, the microstructure, phase formation behavior of the NaZn_{13} -type 1:13 phase and related magnetocaloric effect have been investigated in $\text{La}_{0.6}\text{Ce}_{0.4}\text{Fe}_{11.0}\text{Si}_{2.0}$ as-cast bulk and melt-spun ribbons with different cooling rates. A multi-phase structure consisting of 1:13, α -Fe and La-rich phases is observed in the induction-melted sample with slow cooling. By fast cooling in the melt spinning processing, the La-rich phase can be almost eliminated and thus 1:13 phases with volume fraction as high as 74.4 % directly form in the absence of further heat treatment. The resulting maximum magnetic entropy change of 3.1 J/kgK in 2 T field appears at its Curie temperature of 210 K for the $\text{La}_{0.6}\text{Ce}_{0.4}\text{Fe}_{11.0}\text{Si}_{2.0}$ ribbon prepared in 25 m/s.

Keywords: La-Ce-Fe-Si, fast cooling, magnetic entropy change

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