

# Accepted Manuscript

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PII: S0925-8388(18)32064-4

DOI: [10.1016/j.jallcom.2018.05.327](https://doi.org/10.1016/j.jallcom.2018.05.327)

Reference: JALCOM 46303

To appear in: *Journal of Alloys and Compounds*

Received Date: 29 December 2017

Revised Date: 21 May 2018

Accepted Date: 27 May 2018

Please cite this article as: Z. Nie, Z. Wang, Y. Liang, D. Cong, G. Li, C. Zhu, C. Tan, X. Yu, Y. Ren, Y. Wang, Structural investigations of Fe-Ga alloys by high-energy x-ray diffraction, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.05.327.

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**Structural investigations of Fe-Ga alloys by high-energy x-ray diffraction**

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The magnetostriction of Fe-Ga alloys is significantly affected by the Ga content, which displays two positive peaks with increasing Ga concentration. This work presents a systematic structural investigation of rapidly-cooled Fe-Ga alloys by the synchrotron-based high-energy x-ray diffraction. Ga-rich clusters are evidenced for the alloys beyond the first magnetostriction peak, which is identified by the anomalous peak broadening for the (200) fundamental reflection and a shrink of lattice parameter. The generation of Ga-rich clusters in A2 matrix results in the sudden decrease of magnetostriction after the first magnetostriction peak. These findings are important for designing high-performance Fe-Ga magnetostrictive alloys by structural tuning.

Keywords: High-energy x-ray diffraction; Crystal structure; Magnetostriction;  
Fe-Ga; Superlattice

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