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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