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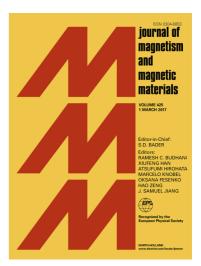
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# **ACCEPTED MANUSCRIPT**

# Effect of short-range order on magnetic and transport properties of Fe<sub>2</sub>MnGa Heusler alloy films

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#### Abstract

Fe<sub>56</sub>Mn<sub>20</sub>Ga<sub>24</sub>, Fe<sub>46</sub>Mn<sub>35</sub>Ga<sub>19</sub> and Fe<sub>39</sub>Mn<sub>25</sub>Ga<sub>36</sub> Heusler alloy (HA) films are investigated. It is shown that as-deposited Fe-Mn-Ga films are fine crystalline with a body-centered cubic (BCC) structure. Annealing of the films leads to the formation of a face-centered cubic (FCC) structure. The BCC to FCC transformation results in a drastic increase in the magnetization, the Curie temperature as well as in a change of the sign of temperature coefficient of resistivity from negative to positive. These effects are discussed in terms of band structures of L2<sub>1</sub> and L1<sub>2</sub> phases of stoichiometric Fe<sub>2</sub>MnGa HA.

### Keywords:

Heusler alloy films, short range order, magnetic properties, transport properties, phase transition

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#### 1. Introduction

Fe<sub>2</sub>MnGa Heusler alloy (HA) represents an interesting alternative [1, 2, 3, 4, 5, 6, 7, 8, 9] to the archetype of ferromagnetic shape memory alloy Ni<sub>2</sub>MnGa exhibiting a characteristic metastability with respect of marten-

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sitic transformation [10, 11]. In comparison to Ni<sub>2</sub>MnGa, the situation in Fe<sub>2</sub>MnGa (or Fe-Mn-Ga in general) is even more complicated since, besides the martensitic instability [1, 3], BCC and FCC types of structure are almost equally thermodynamically probable [1, 12]. Experimentally determined ternary phase diagrams for bulk Fe-Mn-Ga alloys have shown that either BCC or FCC structure or a mixed phase of BCC and FCC

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