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Magnetic Properties of $MnFe_2Ga$ Heusler Alloys AHMED A. ELGENDY, MOHAMMAD SALEHI-FASHAMI, University of Delaware, DAVID SELLMYER, University of Nebraska, GEORGE HADJIPANAYIS, University of Delaware — Recently, MnFe2Ga Heusler alloys have attracted significant attention due to their interesting physical properties such as large magnetic-field-induced strain, giant magnetocaloric effects,large magnetoresistance, and exchange bias behavior [1-2]. These properties make them promising candidates for various practical applications in the field of smart materials, magnetic refrigeration and spintronics. In this work, we prepared MnFe2Ga alloys by melt-spinning and sputtering and studied the structural and magnetic properties. The melt-spun ribbons were prepared with a wheel speed of 30 m/s. The ribbons were annealed at different temperatures for 1 hour and grinded to make fine powders. The grinded powders were also used to make the target that is used in the cluster gun for the fabrication of MnFe2Ga nanoparticles. The structure of the as made, annealed ribbons, and powders displayed a face-centered-cubic structure. The microstructure of the as-made ribbons showed equiaxed grains with an average size of 3-5 μm while the annealed ribbons showed bigger grains with small particles covering homogeneously their surface. The magnetic properties show an enhancement of magnetization while coercivity remains the same with values M(3T) and HC of 85 emu/g and 150 Oe, respectively Transmission electron microscopy with elemental mapping is currently underway to determine the structure and composition of the surface nanoparticles. The work was supported by DOE-BES-DMSE (Grant No. DE-FG02-04ER4612).

[1] C. W. Shih et.al. J. App Phys. 2014, 115, 17D709.
[2] X. D. Tang et.al. J. App. Phys. Lett. 2010, 97, 242513.

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