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Magnetization and scanning tunneling spectroscopy studies of $Mn_{1.5}Ga$ films on GaAs(001) JAESUK KWON, XIN ZHANG, JOHN HATCH, ARCHANA KUMARI, HUI XING, PAYAM TAHERIROSTAMI, HAO ZENG, Physics Department of University at Buffalo, The State University of New York, JEFFREY COGSWELL, JOSEPH A. GARDELLA, Chemistry Department of University at Buffalo, The State University of New York, HONG LUO, Physics Department of University at Buffalo, The State University of New York — Hard magnetic materials have applications in permanent magnets and data storage media. Free of rare earth elements, $L1_0$ structured $Mn_{1.5}Ga$ with high magnetic anisotropy is a potential candidate for such applications. Epitaxial films of $Mn_{1.5}Ga$ with different thicknesses (35 nm – 200 nm) were grown on GaAs(001) by molecular beam epitaxy. Films with thicknesses of 35 nm and 50 nm present uniform surface morphology which consists of overlapping rectangular features with widths and lengths on the order of a few tens to a few hundred nanometers. Measurements of X-ray diffraction reveal the presence of an interfacial layer of Mn_2As between the substrate and $L1_0$ $Mn_{1.5}Ga$. The 200 nm thick film presents a mixture of two different surface structures: domains which consist of faceted tent-like structures and domains with flat terraces (with lateral dimensions of about 500 nm). The magnetic properties of all samples are studied by vibrating sample magnetometer and their correlation with their surface morphology and stoichiometry will be presented. Scanning tunneling spectroscopy measurements of the 200 nm thick $Mn_{1.5}Ga$ film reveal electrical inhomogeneity correlated to the two morphologies. This work was supported by NSF DMR1006286.

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