Abstract Submitted
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Epitaxial growth and spin dependent states of $Co_xMn_ySi_z$ (111) thin films[1] LIANG HE, BRIAN COLLINS, FRANK TSUI, University of North Carolina at Chapel Hill, YONG CHU, APS, Argonne National Laboratory — Epitaxial growth of $Co_xMn_ySi_z$ on Ge (111) substrates has been studied using combinatorial MBE techniques, including that of the Heusler alloy Co_2MnSi. For Si concentration of 25 at. %, in-situ RHEED and ex-situ X-ray diffraction experiments indicate that the epitaxial growth is coherent for atomic ratio Co:Mn between 1 and 9, while the film is microcrystalline for Co:Mn < 1 and it is rough and of poor crystalline quality for Co:Mn > 9. The crystalline quality is the highest around Co:Mn $=$ 4, whereas it exhibits a plateau around a ratio of 2, i.e. the Heusler alloy, Co_2MnSi. Within the region of coherent growth, at coverages below 100Å, the growth front is smooth 2D-like. As thickness increases, the surface morphology systematically changes from quasi-2D into 3D. The morphology transition also depends sensitively on composition, i.e. Co:Mn ratio, and temperature. Spin-dependent states as a function of composition at low coverages have been examined by tunneling spectroscopy using Al_2O_3 as the tunneling barrier and Fe and Nb as the detector layers.

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