

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Structural and chemical ordering and spin polarization in epitaxial films of $\text{Co}_x\text{Mn}_y\text{Ge}_{1-x-y}$ and $\text{Co}_x\text{Mn}_y\text{Si}_{1-x-y}$ ¹ B.A. COLLINS, L. HE, F. TSUI, University of North Carolina at Chapel Hill, Y.S. CHU, Y. ZHONG, Argonne National Laboratory — The Heusler alloys of Co_2MnGe and Co_2MnSi have been predicted to be half-metallic. However, half-metallicity has not been realized owing to its sensitivity to disorders associated with off-stoichiometry and to epitaxial constraints. Combinatorial epitaxial films of $\text{Co}_x\text{Mn}_y\text{Ge}_{1-x-y}$ and $\text{Co}_x\text{Mn}_y\text{Si}_{1-x-y}$ have been grown on Ge (111) substrates in and around the Heusler stoichiometry using molecular beam epitaxy techniques. The structural and chemical ordering of the films has been examined using x-ray microbeam techniques, including energy dependent anomalous diffraction and diffraction anomalous fine structure. These experiments are shown to be sensitive to various disorders, including stacking faults, and chemical dependent vacancies and site swapping. They reveal that the ordering is very sensitive to the atomic ratio between Co and Mn. Magnetic and spin dependent properties have been examined by magneto-optic effects and in-situ point contact Andreev reflection spectroscopy, and they exhibit strong correlation with the structural and chemical ordering.

¹DOE DE-FG02-05ER46216 and NSF DMR-0441218.

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Date submitted: 04 Dec 2007

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