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Interfacial Structure in Co_2MnSi/GaAs(001) Spin Injection Heterostructures SAHIL PATEL, Univ of California - Santa Barbara, KEVIN CHRISTIE, CHAD GEPPERT, GORDON STECKLEIN, LEE WIENKES, University of Minnesota, FENGYUAN SHI, ASHUTOSH RATH, University of Wisconsin, BRIAN SCHULTZ, Univ of California - Santa Barbara, OLEG MRYASOV, WILLIAM BUTLER, University of Alabama, PAUL VOYLES, University of Wisconsin, PAUL CROWELL, University of Minnesota, CHRISTOPHER PALMSTROM, Univ of California - Santa Barbara, CSPIN COLLABORATION — We report on the role of the interface formation and structure of molecular beam epitaxially grown Co_2MnSi/GaAs(001) heterostructures with measured spin accumulations of approximately 60% at 30K in GaAs. *In-situ* scanning tunneling microscopy (STM) was used to study morphology and x-ray photoelectron spectroscopy (XPS) for the evolution of core level emission peaks as a function of film thickness for thin epitaxial Co_2MnSi films. Alternate monolayers of Co and MnSi were deposited to form an epitaxial template layer upon which codeposition of Co, Mn, and Si was used to grow thicker single crystal films. By combining the in-situ XPS elemental layer-by-layer peak evolutions and STM results with ex-situ high angular dark field scanning transmission electron microscopy (HAADF-STEM), x-ray diffraction, SQUID magnetometry and first-principles calculations, consistent models of the growth and interface formation have been developed and will be presented. This work was supported by C-SPIN, one of the six centers of STARnet, a SRC program sponsored by MARCO and DARPA; and by the NSF MRSEC program.

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