Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Structure and thermal stability of thin Fe films grown on Al(001) surfaces with Ti as an interface stabilizer[1] R.J. SMITH, C.V. RAMANA[2], G. BOZZOLO, Ohio Aerospace Institute, Cleveland, OH 44142, B.-S. CHOI, Physics Department, Jeonju University, Jeonju, 560-759, Korea — Achieving thermal and chemical stability of thin metal film device structures at elevated operating temperatures is very important, and becomes more difficult as the film thickness is reduced to the nanometer regime. We investigated the structure and thermal stability of Fe films grown on Al(001) surfaces with thin Ti interlayers at the interface. Using Rutherford backscattering and channeling (RBS/c), we identify the bcc structure of the Fe(001) film on the fcc Al(100) substrate. RBS/c and low-energy ion scattering (LEIS) were used to evaluate the thermal stability of the interface. BFS model calculations were used to understand the stability of the Ti interlayer, and its evolution at increased temperatures. The epitaxial Fe structure is observed to be stable up to ∼400 °C, although Al atoms, apparently captured in the Fe film during growth, begin to diffuse to the Fe surface at ∼200 °C.

[1]Work Supported by NSF Grant DMR-0077534
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Date submitted: 06 Dec 2004 Electronic form version 1.4