Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Ab initio Investigation of the Failure of Efficient Spin-Injection in Fe/GaAs Superlattices SINEAD GRIFFIN, NICOLA SPALDIN, ETH Zürich — Magnetic metal-semiconductor systems have been widely studied for use as spintronic devices. The injection of elemental ferromagnetic Fe into GaAs shows great device potential because of the relativity high Curie temperature of Fe compared to other possible injection materials. However, spin-injection in Fe/GaAs has not been successful with several phases such as FeAs and Fe_2As forming at the interface. We perform Density Functional Theory calculations on bulk FeAs and Fe_2As to elucidate the structural and magnetic ground states. We then incorporate these Fe-As layers into GaAs/FeAs superlattices and investigate the resulting structures. Both the effects of Fe content and the number of layers in the heterostructure on the magnetic and electronic properties are considered. Our results show that the magnetic ground state of the FeAs compounds helps to explains the failure of spin-injection in these superlattices.

Sinead Griffin
ETH Zürich

Date submitted: 28 Nov 2010 Electronic form version 1.4