Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Thermally induced spin accumulation at Al/Co_2TiSi and Al/Co_2TiGe contacts[1] VOICU POPESCU, BENJAMIN GEISLER, PETER KRATZER, Faculty of Physics, University Duisburg-Essen, Duisburg — Spin injection from a ferromagnet in a semiconductor substrate can be accomplished either by applying an external voltage or a temperature gradient. In the latter case, one exploits the Seebeck effect, with the temperature gradient across the contact directly resulting in a difference in chemical potentials in the two spin channels due to the spin-dependence of the Seebeck coefficient. The magnetic Heusler alloys Co_2TiSi or Co_2TiGe exhibit half-metallic ferromagnetism in their ideal $L2_1$ crystal structure, with a potentially high degree of spin polarization of the injected current. As such, they recommend themselves for integrated spin injectors in combination with the closely lattice-matched Al contact layer. We investigate the possibility of employing $Al/Co_2TiX/Al$ (X=Si,Ge) trilayers as thermally driven spin injectors by means of first-principles calculations of the electronic structure and of the thermoelectric transport properties. Our results show that the spin-dependent Seebeck effect is sensitive to the atomic structure of the Heusler/Al interface. In particular, for a thin Co_2TiSi or Co_2TiGe layer terminated by a TiSi or TiGe atomic plane, the thermal spin accumulation is found to be of the same order of magnitude as the effective Seebeck coefficient.

[1]Funded by DFG, SPP 1538

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Date submitted: 14 Nov 2013 Electronic form version 1.4