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Spin dependent scattering in all Heusler alloy CPP-GMR nanostructures for magnetic storage applications OLEG MRYASOV, KONSTANTIN NIKOLAEV, THOMAS AMBROSE, Seagate Technology LLC — At the reduced sensor dimensions necessary for high density magnetic recording, the lower impedance of current-perpendicular- to the plane giant magnetoresistance (CPP-GMR) based read heads likely will take over the currently used tunneling MR based sensors. Main obstacle on the of realizing this transition is relatively low amplitude of the conventional CPP-GMR stacks. In this work, we investigate all-Heusler CPP-GMR spin-valves . The combination of alloys has been chosen in order to match spin states majority channel[1]. We focus on fundamentals of spin dependent interface and bulk scattering as it is affected by substitution disorder in these ternary alloys. Ab-initio electronic structure calculations employed to account for complex band structure of these ternary. We investigate interface scattering contribution within a simple model relying on the electronic band structure calculated for bulk of ferromagnetic and non-magnetic component of all Heusler CPP GMR tri-layer. We use model to investigate how to minimize impact of disorder induced states. Experimentally, these structures have been realized using conventional sputter deposition techniques and found to exhibit significant interface scattering contribution to MR signal. [1] T. Ambrose and O. Mryasov, United States Patent 6,876,522 (April 5, 2005); T. Ambrose, O. Mryasov, "*Growth and Magnetotransport Properties of Thin Co_2MnGe Layered Structures*", Springer Verlag Series. 2005.

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