Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Temperature gradient assisted spin transport in nonlocal lateral spin valves SAIDUR RAHMAN BAKAUL, SHAOJIE HU, TAKASHI KIMURA, Kyushu University — The advent of non-local spin transport devices (NSTD) provide further possibility for nano spin-electronic devices as these are capable of generating electronic charge-free and non-dissipative pure spin current. The most imperative and primary issue associated with these generic spintronic devices is finding the ways to enhance the amplitude of pure spin current and the simplest way to do that is increasing the excitation charge current density. The bottleneck for this method is the Joule heating, which reduces the pure spin current. However, recent discoveries of spintronic versions of the thermoelectric effects, such as spin-dependent Seebeck and Peltier effects convincingly imply that, in a properly designed device, the thermal gradient may provide aiding impact for pure spin current. In this work we have experimentally studied the multi terminal NSTDs and observed room temperature enhancement of the spin signal at high bias current. The magnitude of the spin signal is asymmetric with respect to the DC bias polarity. We discuss about the role of different thermoelectric effects on the observed spin signal enhancement. These results are important as it may open the road to tackle the Joule heating induced degradation of spin signal in NSTDs.

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Date submitted: 07 Nov 2012 Electronic form version 1.4