Bias-independent spin signals in a tunnel-junction-based non-local spin valve\textsuperscript{1} XIAOJUN WANG, HAN ZOU, L.E. OCOLA, R. DIVAN, YI JI\textsuperscript{2} — A pure spin current can be generated in the non-magnetic component of a non-local spin valve (NLSV). It has been demonstrated recently that the pure spin current can be used for spin transfer torque and spin-Hall effects. A high spin current density is desirable for realizing these effects, and therefore a large d.c. bias current will be applied. It is essential to maintain high degree of spin polarization at a high bias current. It has been previously reported that the spin polarization decreases drastically in a tunnel-junction-based CoFe/Al/NiFe NLSV. The goal of this study is to investigate the dependence of spin signals upon a d.c. bias current in tunnel-junction-based Co/Cu/Co NLSV’s. Submicron Co/Cu/Co NLSV’s are fabricated by e-beam lithography combined with angle deposition. A layer of 2 nm Al\textsubscript{2}O\textsubscript{3} is deposited at the Co/Cu interface to form a tunnel barrier. A spin signal $> 1 \text{m}\Omega$ is observed at room temperature (RT). A d.c. current up to 1.0mA is applied at both 4.2 K and RT. No change of spin signal is observed for an injection current density $> 10^6 \text{A/cm}^2$.

\textsuperscript{1}This work is supported by U.S. DOE Grant No. DE-FG02-07ER46374. Use of the Center for Nanoscale Materials was supported by the U.S. DOE under contract No. DE-AC02-06CH11357.

\textsuperscript{2}jyi@physics.udel.edu

Xiaojun Wang
Phys. Dept. University of Delaware

Date submitted: 26 Nov 2008

Electronic form version 1.4