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Nonlocal spin-transfer with low-resistance AlO_x spin injection interface and ohmic spin absorption interface YUNJIAO CAI, CHUAN QIN, SHUHAN CHEN, YI JI, Univ of Delaware — Mesoscopic nonlocal spin valves are fabricated for the purpose of spin-transfer with pure spin current. The device consists of a 300 nm wide Py (NiFe alloy) spin injector (F1), an 80 nm wide Py spin detector (F2) and an 80 nm wide Cu channel. The thickness of F1, F2, and Cu is 15 nm, 3 nm, and 110 nm, respectively. A 3 nm layer of low-resistance AlO_x is placed at the F1/Cu interface to mitigate the spin resistance mismatch between Py and Cu and to provide substantial injection spin polarization. The F1 injector and the F1/AlO_x/Cu interface are robust enough to sustain a d.c. injection current up to 6 mA. The F2/Cu interface remains ohmic to facilitate an efficient absorption of the pure spin current from the Cu channel into the F2. A nanoscale magnetic domain in F2 underneath the F2/Cu interface can be reversibly switched between 5 K and 150 K via spin-transfer by the pure spin current. The critical injection current for the reversal at 100 K is ˜1.5 mA, which is significantly lower than those in previous studies for nonlocal spin-transfer.

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