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Spin injection into Pt-polymers with large spin-orbit coupling[1]
DALI SUN, RYAN MCLAUGHLIN, GENE SIEGEL, ASHUTOSH TIWARI, Z. VALY VARDENY, University of Utah — Organic spintronics has entered a new era of devices that integrate organic light-emitting diodes (OLED) in organic spin valve (OSV) geometry (dubbed bipolar organic spin valve, or spin-OLED), for actively manipulating the device electroluminescence via the spin alignment of two ferromagnetic electrodes (*Science* **337**, 204-209, 2012; *Appl. Phys. Lett.* 103, 042411, 2013). Organic semiconductors that contain heavy metal elements have been widely used as phosphorescent dopants in white-OLEDs. However such active materials are detrimental for OSV operation due to their large spin-orbit coupling (SOC) that may limit the spin diffusion length and thus spin-OLED based on organics with large SOC is a challenge. We report the successful fabrication of OSVs based on pi-conjugated polymers which contain intrachain Platinum atoms (dubbed Pt-polymers). Spin injection into the Pt-polymers is investigated by the giant magnetoresistance (GMR) effect as a function of bias voltage, temperature and polymer layer thickness. From the GMR bias voltage dependence we infer that the "impendence mismatch" between ferromagnetic electrodes and Pt-polymer may be suppressed due to the large SOC.

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