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Voltage-controlled spin transport through a pair of Buckminster fullerene molecules encapsulating cobalt atoms[1] ALIREZA SAFFARZADEH, GEORGE KIRCZENOW, Simon Fraser University — Carbon-based nanostructures such as fullerenes, carbon nanotubes, and graphene, are promising candidates for spintronic applications because of their weak spin-orbit coupling and hyperfine interaction which lead to long spin coherence lengths. In particular, a fullerene C_{60} molecule is an interesting carbon nanostructure which can be used as a molecular bridge in magnetic tunnel junctions due to its remarkable structural stability and electronic properties which make the molecule convenient for easier spin injection in magnetic nanojunctions. Here, we show that using cobalt atoms encapsulated in a pair of Buckminster fullerene molecules sandwiched between gold electrodes, density of states spin polarizations as large as 95% are found by varying the gate and/or bias voltage, due to the spin-splitting of Co $3d$ orbitals. The current-voltage characteristics and strong (up to 100%) spin polarization of the current indicate that the device can be utilized for highly efficient spin injection into nonmagnetic conductors. These results open the way to voltage-controlled spin filters and magnetic sensors using molecular magnetic junctions.

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