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On the Role of Spin-Orbit Coupling in the Spin Response of C_{60}-based Spintronics Devices[1] THO NGUYEN, FIJIAN WANG, Department of Physics & Astronomy, University of Utah, 115 South 1400 East, Salt Lake City, Utah 84112, USA, XIAO-GUANG LI, Hefei National Laboratory for Physical Sciences at Microscale, People's Republic of China, EITAN EHRENFREUND, Technion-Israel Institute of Technology, Israel, VALY VARDENY, Department of Physics & Astronomy, University of Utah, 115 South 1400 East, Salt Lake City, Utah 84112, USA — We report comprehensive studies of the spin response in C_{60}-based spintronics devices such as spin valves and diodes. The buckeyball C_{60} molecules are composed of ∼99% ^{12}C carbon atoms having spinless nuclei with zero hyperfine interaction. Therefore it was believed that the spin diffusion length in C_{60}-based spin-valves is large, and the magnetoresistance (MR) in C_{60} diodes is negligible small. Surprisingly, we obtained a small spin diffusion length which we believe to be due to a relatively strong spin-orbit (SO) coupling in the material. We also found that the MR in C_{60} diodes is relatively small, with characteristic magnetic field response dominated by the SO coupling with strength, $\xi \approx$ ½ μeV, more than ten times larger than the HFI constant. This was verified by measuring the response of ^{13}C-rich C_{60} diodes.

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