

Spintronic devices with fullerenes

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Abstract

Organic and carbon-based materials have recently caught the attention of spintronics, and significant efforts are being made towards their integration in this field [1,2]. One of their most attractive aspect for spintronic applications is the weakness of their spin scattering mechanisms, implying that the spin polarization of the carriers can be maintained for a very long time in these materials. Noticeably, spin relaxation times of microseconds have been reported by different techniques, with values exceeding by orders of magnitude the characteristic times detected in inorganic materials. Moreover, these materials might have tunable chemical properties, opening a way for the integration of synthetic chemistry into spintronic devices.

In this talk I shall focus on different spintronic devices with C_{60} fullerenes. In the first part, I will show how C_{60} acts as a spacer in hybrid ferromagnetic/organic spin valves [3]. I will present room temperature magnetoresistance data that consistent with a multistep tunneling regime.

In the second part I will introduce a magnetic tunnel transistor with C_{60} as a collector [4]. In this device, hot-electron magnetoconductance values of up to 90% at room temperature have been recorded. Moreover, this magnetoconductance can be increased to any arbitrarily high value by suppressing the non-spin polarized current flowing in the device

References

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