Development of simulation tools for devices based on magnetic semiconductors

Título Development of simulation tools for devices based on magnetic semiconductors

Autor/a Enrique Comesaña Figueroa

Directores Antonio García Loureiro

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Abstract The main goal of Spintronics (also called Magnetronics) is to enable the spin of the electron as information carrier to create new devices that process, transmit and store information more efficiently. Spintronics has been impelled by the discovery of the Giant Magneto-Resistance, which allows to increase the information density in hard disks in a more-than-Moore tendency. The suitable materials for spintronics have been studied since the 70s, but in the last years, interest has reemerged thanks to the new techniques to manipulate materials in micro and nano scale. The discovery of ferromagnetic semiconductor materials at room temperature could make possible the integration of new spintronic devices with traditional electronic systems, or even substitute them completely, maintaining the well-known fabrication techniques in micro and nano electronics. The mail goal of the presented work is to verify if the simulation methods used in traditional semiconductor devices can be applied to simulate the behavior of spintronic devices. With this purpose, the spin variable has been added to the drift-difussion model and recombination model equations, to account for the effect of spin polarization. These modified equations were implemented in a in-house developed simulator to provide insight on the physical response of several basic configurations that could be common in future spintronic devices, such as the PN junction and the resonant tunnel barrier.

LIGAZÓNS

Teseo

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Referencia BibTex

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