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Sensing spin and spinning memory: A chiral-based spin sensors and magnetic memory devices without a permanent magnet

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Several technologies are currently in use for computer memory devices. However, there is a need for a universal memory device that has high density, high speed and low power requirements. To this end, various types of magnetic-based technologies with a permanent magnet have been proposed. Recent charge-transfer studies indicate that chiral molecules act as an efficient spin filter. We utilize this effect to achieve a proof of concept for a new type of chiral-based magnetic-based Si-compatible universal memory device without a permanent magnet. More specifically, we use spin-selective charge transfer through a self-assembled monolayer of polyaniline to magnetize a Ni layer. This magnitude of magnetization corresponds to applying an external magnetic field of 0.4 T to the Ni layer. The readout is achieved using low currents. The presented technology has the potential to overcome the limitations of other magnetic-based memory technologies to allow fabricating inexpensive, high-density universal memory-on-chip devices. In the talk author will present nano tool box and show studies of charge transfer, spin transfer and energy transfer in the hybrid layers as well as collective transfer phenomena. These enable the realization of room temperature operating quantum electro optical devices.

Biography

Yossi Paltiel is currently carrying out his research work on the development of room-temperature quantum nano devices. He published over 60 papers and has applied for 9 patents. He has a spinoff company in collaboration with Prof Oded Shoseyov. He did his PhD at the Physics Department at Weizmann then he joined a start-up company developing optical routers. Later he joined the Solid State Physics group at Soreq NRC. In 2008, during a 1 year sabbatical he was one of the core founders of a new start up company. Since July 2009, he is leading the Applied Physics Department Quantum Nano Engineering group at the Hebrew University and is now the head of the department.

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