Magnetic Devices based on Extraordinary Hall Effect (Ramot)

code: 11-2010-118

Alexander Gerber, T.A.U Tel Aviv University, Exact Sciences, School of Physics and Astronomy

The Invention

Magnetic based sensors and memory elements based on the Extraordinary Hall Effect (EHE). Non-volatile memories can be constructed by utilizing anisotropic thin films resulting in stable hysteresis which can represent binary states. Extremely sensitive sensors can be constructed which generate voltage as a function of magnetic disturbances.

Potential Applications

Memory devices complementing or replacing semiconductor based memories are possible applications. Magnetoresistive based memories (MRAMs) are being developed by several important IC houses for incorporation into future arrays. MRAMS based on the EHE could be a viable alternative to flash memories for non-volatile memory. Ultra sensitive sensors can be prepared by using the anisotropic properties of spin electronics to stimulate sensitivity to very high levels. Magnetic field sensors are useful in fields such as vehicle detection, positioning, mobile navigation and others.

Advantages

EHE based devices possess distinct advantages over semiconductor devices. They are much more thermally stable which may be attributed to the fact that they are based on high resistivity materials and the temperature dependence of their relevant properties is weak. Another major advantage is the linear response over a wide range of field values which is a very important parameter in electronic devices. Commercial implementation may be expedited due to the simplicity of building EHE layers. Contrary to semiconductors and other magnetic memories which may require dozens of deposition and patterning lays, only a few layers are necessary and these can also be easily tailored to the requirements of the circuit. A further attractive characteristic of EHE devices is that they can be operated up tot GHz frequencies in contrast to semiconducting magnetic devices which are limited to the MHz range.

Patent

Three granted US patents.

Contact for more information:

Ofer Shneyour, VP Business Development, ICT, +972.3.640.6496

Ramot at Tel Aviv University Ltd. P.O. Box 39296, Tel Aviv 61392 ISRAEL
Phone: +972-3-6406608
Fax: +972-3-6406675