Development of magneto-electronic devices for printed electronics (Ramot)

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Printable electronics and 3D printing are rapidly expanding technologies with a huge potential market share.

Incorporation of magnetic sensors compatible with printing technologies would be a valuable expansion of the printed electronics abilities.
Magnetic sensors used today are produced by sophisticated vacuum deposition techniques and their production is unsuitable for printing processing.

Our technology

We developed a method of fabrication and implementation of magnetic sensors specifically for printing processing.

Our prototype sensors are produced from ink containing ferromagnetic nanoparticles. After a mild heat treatment, the films become electrically conducting.
The response to magnetic field is detected by measurement of the so-called extraordinary Hall effect (EHE). The measurement is technically identical to a standard measurement of electrical resistance with a difference of monitoring the voltage generated perpendicular to an electrical current flowing across the printed film. Typical field sensitivity values of the Hall resistance are in the range of 10–100 mΩ/T, which indicates that fields of the order of 10-100 mT could be easily sensed.

The sensors are intended for various applications, such as linear and rotational motion sensing, and contactless switches.

Applications

They could be integrated in 3D printed structures, together with their electrical contacts, which could be made out of printed silver or copper ink, for example.
A viable application example would be integrating them into printed circuit boards where they can be directly connected to their driving circuit.

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