Device for Electric Field Induced Local Magnetization (Yeda)

code: T4-1886

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Summary

A new technology developed by a group of researchers led by Prof. Ron Naaman from the Weizmann Institute, harnesses the advantages of electron spin orientation for memory and information transmission applications. The innovation enables replacement of the traditional current-based semiconductor technologies, yielding faster computing speed, power efficient memory and increased storage capacity. This new spintronic technology is based on organic molecules deposited on a semiconductor surface. It requires less than 1V for operation, with no current induction requirements and, unlike other spintronic technologies, it does not have a magnetic default state, has a simple structure, and most importantly, it enables to produce magnetic domains of 10 nm, overcoming the 50 nm-domain limitation of other spintronic technologies. These attributes are enabled thanks to the chirality of the molecules and absence of ferromagnetic components. This new technology will enable achievement of what is considered the holy grail of designing memory and information transmission, which is the ability to induce and locally manipulate magnetism solely through electric fields, with high switching frequency and magnetic domains of only a few nanometers.

Applications

Low power consuming components in several markets including electric vehicles, storage solutions, medical devices and sensors:

- Magneto-resistive sensors / components
- Memory (including MRAM and flash memory devices)
- Logic components
- Spin-based transistors
- Communication components
- High-power consuming components (e.g. transformers)
- Spintronic quantum computing.

Advantages

- 1 MHz)
- Low energy consumption of