

High electric current conversion ratio spintronics device

Spin / electricity current conversion ratio up to 100% with low cost material!

Summary

Spin current known to have a low energy dissipation is used for spintronics device and has a high expectation due to its high energy transmission efficiency. The proposed method to detect the spin current is to convert spin current generated by the inverse spin-Hall effect to electricity current and take out as voltage. However, the conventional spin / electricity current conversion ratio of the inverse spin-Hall effect material is maximum 10-25% so its ratio is low.

This invention is about the drastic improvement of the spin / electricity current conversion ratio. Specifically, a low cost anisotropic conductive material (PEDO: polyethylenedioxythiophene) is used as inverse spin-Hall effect material and the principle indicates that the spin / electricity current conversion ratio can be drastically improved to 100%.

Effect

Possible to improve the low spin current conversion ratio by using different energy source (heat, sound wave, light, etc)

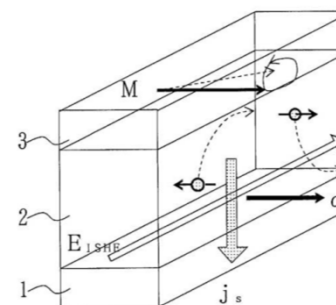
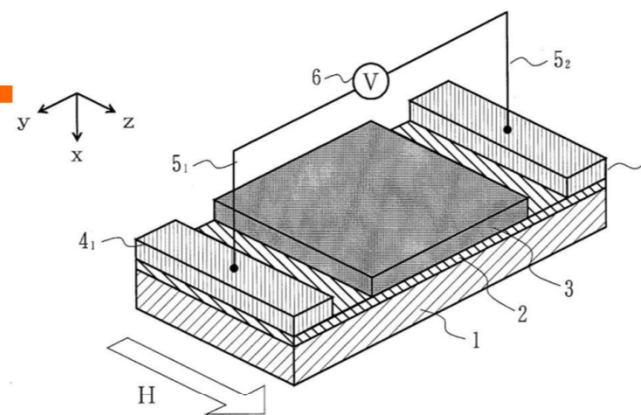
Application

- Electricity conversion device

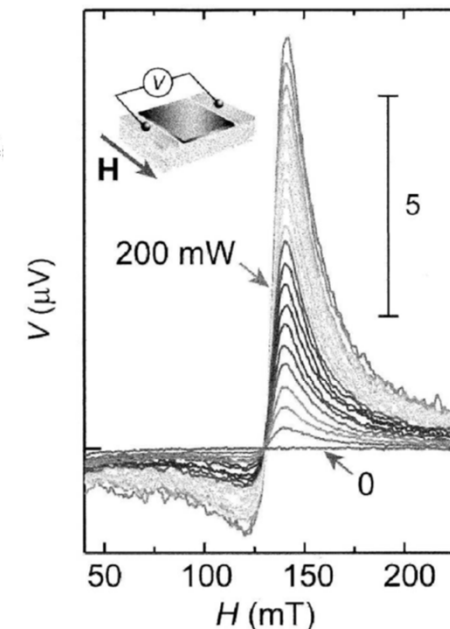
Patent Data Sheet

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1. Non-conductive circuit board 2. Spin / current electricity mutual conversion material layer 3. Spin current generation material layer 4, 4'. Electrode 5, 5'. Pull out electrode 6. Voltmeter



【Up left】 Composition of the spintronics device

【Up right】 Magnetic field intensity dependence of the output voltage when applying the magnetic field in H direction

【Down left】 Spin current and electricity current states

Contact

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