

# Light-spin current conversion element and its manufacturing

Improvement of design degree of freedom for spin current element -  
Possible to generate spin current from a light source

## Summary

In the recent years, the spintronics using the electron's spin degree of freedom are attracting attention. Many functions of spintronics are driven by spin current. The conventional spin generation method has a limitation on the material, composition and external energy (electric current, magnetic field, heat, electro-magnetic), so the element design doesn't have enough degree of freedom.

By focusing on latter issue, this invention can provide a new source of spin current from a "light source" by using surface plasmon resonance which will increase the effective temperature of magnon magnetic substance layer, or the effective electron temperature of the inverse spin-Hall effect layer. Therefore, since the external energy source mentioned above which could generate spin current will increase, the design degree of freedom for spin current conversion element is improved.

## Effect

Improvement of design degree of freedom for spin current element

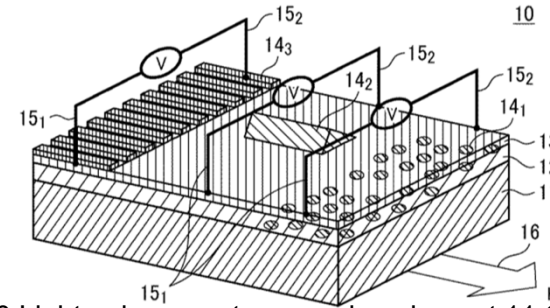
## Application

- Use various energy such as light, heat, vibration, electromagnetic wave, etc. for power generation
- Build a research domain on new energy conversion technology or fusion

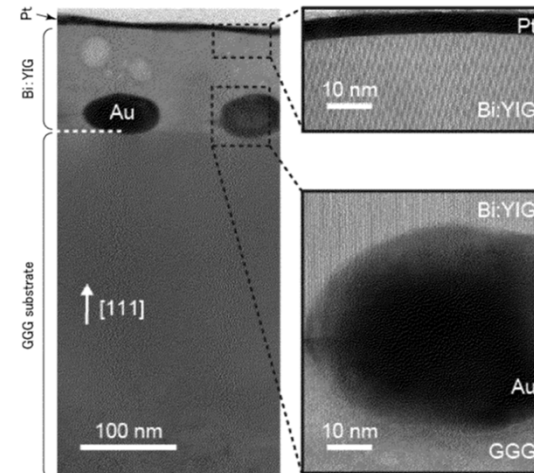
## Patent Data Sheet

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10. Light-spin current conversion element 11. Circuit board 12. Magnetic substance layer 13. Inverse spin-Hall effect layer 14-1,2,3. Surface plasmon resonance generation layer 15-1,2. Electrode 16. Magnetic field application

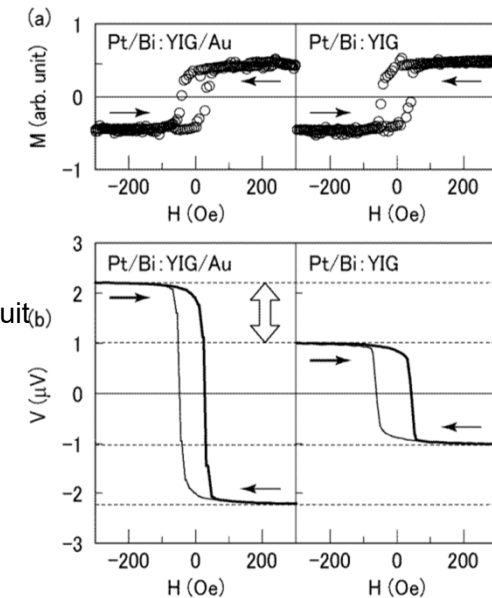


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【Up left】 Conceptual figure of the light-spin current conversion element

【Up right】 Electromotive force figure of the invention by using Au corpuscle as micro metal, Bi:YIG as magnetic substance layer, Pt as inverse spin-Hall effect layer and applying 350mW white light

【Down left】 TEM picture of the light-spin current conversion element section