

# Surface Plasmon Polaritons for Magnetic Applications

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Surface Plasmon Polaritons (SPPs) are very useful for magnetic applications, especially for Heat Assisted Magnetic Recording (HAMR), magneto-optical sensing, and triggering magnons, because SPPs can be confined into a small spot beyond its optical interference limit. HAMR head is a good example for the application of SPPs<sup>1)</sup>. Optical light is efficiently transferred into a SPP waveguide, and is effectively propagated to a Near-Field Transducer (NFT) at the end of the waveguide in HAMR head. A calculated result at a recording layer and a NFT tip at the end of SPP waveguide as an example is shown in Fig. 1. Magnetic sensing technique applying SPPs is also beneficial to sensitively detect magnetic condition<sup>2)</sup>. Kretschman-Raether configuration at a critical incident angle as shown in Fig. 2 is very sensitive to reflective index. It can detect magnetization direction by its reflectivity of an incident light. For example, the reflectivity changes about 4 point at the incident angle  $\theta \sim 41$  degree as shown in Fig. 3. It could detect magnons distribution if we would apply NFT as a detecting sensor. As T. Satoh reported<sup>3)</sup>, an optical light can trigger magnons, so SPPs must set off magnons if we control SPPs. We also found that the wavelength of SPPs can be controlled by a SPP waveguide structure as shown in Fig. 4<sup>4)</sup>.

## References

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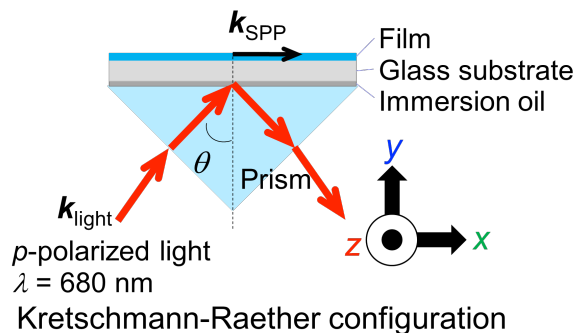
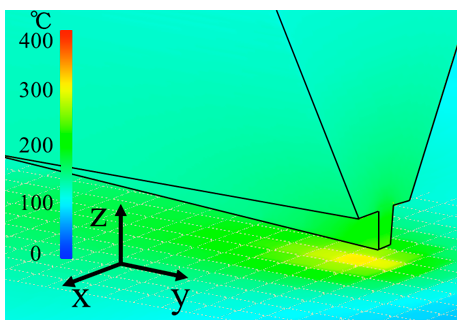


Fig. 1 One of the calculated results of temperature for HAMR. Fig. 2 Kretschmann-Raether configuration.

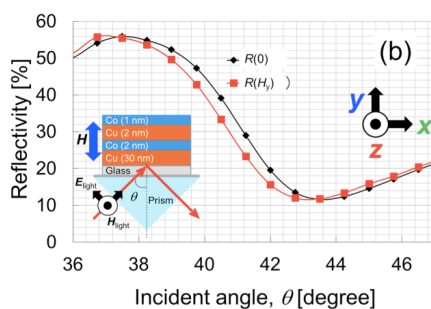


Fig. 3 Reflectivity change depending on magnetic field.

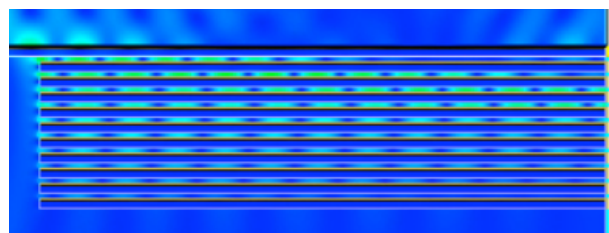


Fig. 4 SPPs in metallic multilayers.