

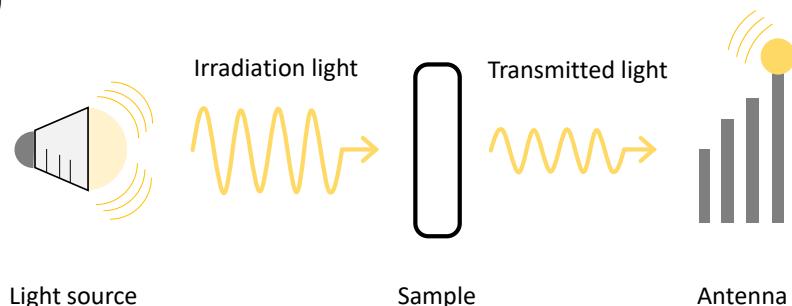
Strong interaction between light and electrons (4)

“Transmission ESR/FMR measurement method”

Product used : Electron spin resonance spectrometer (ESR)

Interaction between microwave photon and spins means in other words, interaction between resonating photon in a closing space and spins. Thus, measuring spectra using a non-resonant device can prevent the Purcell effect or strong coupling from distortion of intrinsic spectra. Figure 1(a) is a drawing expressing a typical spectroscopy. A light source irradiates light to a sample, and transmitted light is detected. A simple and non-resonant wave guide, as shown in Fig.1(b), can provide absorption spectra of para- and ferromagnetic samples which have a high spin density.

(a)



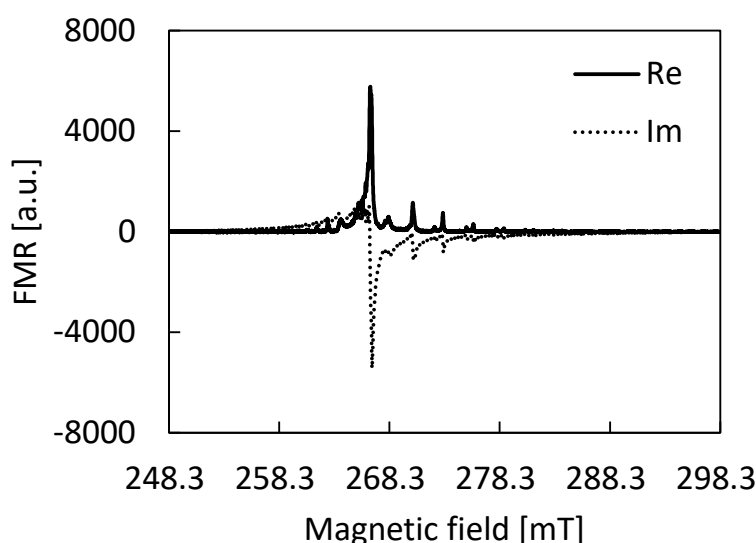
(b)



Fig.1 (a) A drawing of transmit absorption measurement. (b) An example of transmission ESR/FMR measuring device using a wave guide.

Transmission FMR spectrum

Spectra in Fig.2 are an FMR spectra of YIG-thin film (20 μ m thickness, conf. Application Note ER200008E) using a detection device as shown in Fig.1(b). Merits of this method are that tuning of the filling factor and magnetic modulation are not necessary. Furthermore, dependence of FMR spectra on the frequencies is easily obtained. Application Note ER200010 will explain it more.



Set Parameters & Conditions

Sample	3 × 5 mm, 20 μ m thickness YIG
Angle[deg.]	—
Temp.	Room Temp. (26°C)
MW Frequency[MHz]	9400
MW Power[mW]	0.5set -20dB input = 0.005
Ho[mT]	Sweep width 50 mT (Field corrected by Mn ²⁺)
Mod. Width [mT]	—
Mod. Freq. [kHz]	—
Mod. Phase [deg.]	0
Sweep Time[s]	30
Acc.	2
Amp. Gain	40 dB(CA-261F2) + 0.6uF(LPF) → CN115
Tc[s]	—

Fig.2 An example of transmission FMR spectra using YIG thin film.

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