

Visualization of microwave magnetic field distributions of microstrip line using Bi:NIG and ITO indicators

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1. Introduction

There is remarkably progressing in the aspect of characterization and optimization of modern electronic devices for 5G communication technology. It is important to investigate electromagnetic property of microwave devices. Various approaches have been proposed for their solutions. We investigated and visualized the microwave magnetic field distributions of microstrip line by thermoelastic optical indicator microscopy (TEOIM)¹⁾ using ITO and garnet thin films.

2. Experiment

Figure 1 shows the experimental configuration where the microstrip line used as a device under test. Garnet (Bi:NIG) and ITO used as microwave enhancement layers and optical indicators, respectively. The microwave signal was supplied from 1 to 10 GHz by a signal generator. The incident light of circular polarized was changed to elliptically polarized light by the thermoelastic effect of the optical indicator. The reflected light intensity measured by a CCD camera.

3. Results and discussion

Figure 2 shows an optical image of a microstrip line and TEOIM images measured for 6 GHz with ITO and ITO/garnet indicators. Standing wave of microwave magnetic field was clearly observed. It was observed that the position of the standing wave shifted for the image measured with the ITO/garnet. We considered that the shift of the signal is due to ferromagnetic resonance in the garnet film.

4. Acknowledgement

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1) H. Lee et al., Scientific Reports, **6**, 39696 (2016)

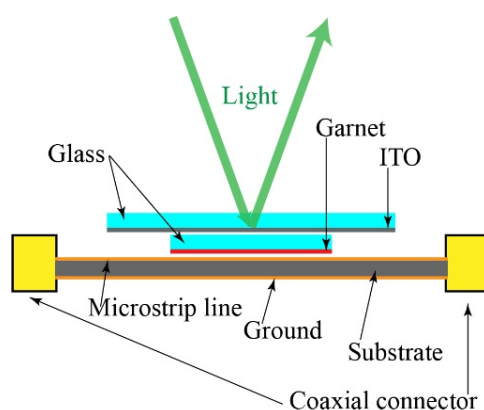


Figure 1. Experimental setup

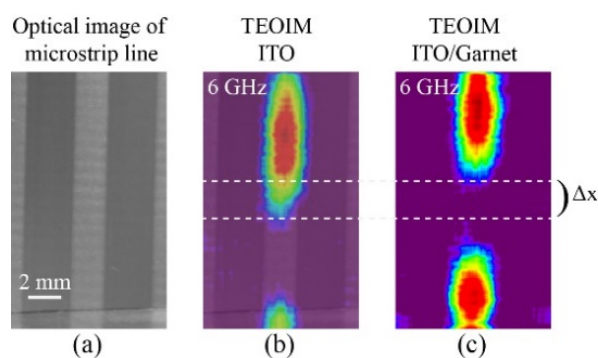


Figure 2. (a) Optical image of microstrip line. The magnetic field distribution (b) without and (c) with garnet film.