

## EU02

## Multi-Coupled Resonators with YIG Micro Stairs

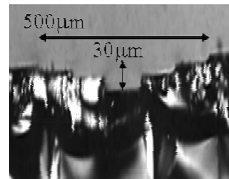
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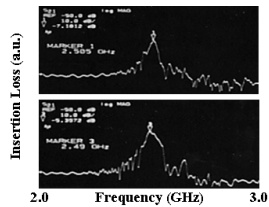
The latest dicing saws possess extremely high cutting accuracy. In particular, the vertical accuracy of a few tens of nm is a prominent advantage in comparison with several lithography techniques. We have recently demonstrated that mechanical process utilizing the dicing saw is promising in the preparation of the YIG gratings with nano-order depth modulation [1]. These apodized YIG gratings have caused superior characteristics in both of the band-stop and band-pass filters [2]. In the present study, we designed and tested the unique resonators including the YIG micro stairs, which were mechanically fabricated.

A high-precision dicing saw, Disco DFD6340, was used to prepare the micro stairs on the surface of 25  $\mu\text{m}$ -thick YIG single crystal film that was epitaxially grown on the GGG substrate. Symmetrical micro stairs of three steps (see the right figure) were prepared by carving five grooves. Firstly, 100  $\mu\text{m}$ -thick diamond blade cut a 30  $\mu\text{m}$ -deep line. Next, two grooves with a depth of 20  $\mu\text{m}$  were closely prepared on the both sides of the line. Finally, 10  $\mu\text{m}$ -deep two grooves were formed on their outsides.



As shown in the figure, the cross-section microscope image indicated that the flat treads and step height of 10  $\mu\text{m}$  were realized in the micro stairs as designed.

Shown in the left figures are the propagation characteristics of the resonator filters including a single groove with a depth of 30  $\mu\text{m}$  and a width of 500  $\mu\text{m}$  (upper) or the symmetrical micro stairs (lower). By the existence of the micro stairs, the insertion loss was decreased from 7.2 dB to 5.4 dB. In addition, the 3-dB bandwidth was increased from 25 MHz to 40 MHz. This is probably due to the fact that the facing YIG rectangles in the symmetrical stairs are magnetically multi-coupled through the rf filed linkage across the grooves.



[1] A. Maeda et al., phys. stat. sol. (c) 4, 4396 (2007).

[2] A. Maeda et al., IEEE Trans. Magn. 42, 3096 (2006).

## EU03

## Microwave Absorption Properties of Mn-Co-Sn Doped Barium Ferrite Nanoparticles

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Substituted barium ferrite  $\text{BaFe}_{12}(\text{Mn}_{0.5}\text{Co}_{0.5}\text{Sn})_{3/2}\text{O}_{19}$  has been prepared from sol-gel method. X-ray diffraction (XRD), transmission electron microscope (TEM), vibrating sample magnetometer (VSM) and vector network analyzer, were used to analyze the structures, static and dynamic magnetic properties of prepared samples. particles are irregular non spherical shape with broad size distribution. The Substitution was very effective in reducing  $H_c$ . Based on microwave measurement on reflectivity,  $\text{BaFe}_{12}(\text{Mn}_{0.5}\text{Co}_{0.5}\text{Sn})_{3/2}\text{O}_{19}$  may be a good candidate for electromagnetic compatibility and other practical applications at high frequency.