

課題番号 : F-21-AT-0070  
利用形態 : 技術代行  
利用課題名(日本語) : PEDOT:PSS の断面解析  
Program Title (English) : Cross section analysis of PEDOT:PSS  
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キーワード/Keyword : Magnonics, Spin waves, Microstructuring, Organic Polymer, 形状・形態観察、分析

### 1. 概要(Summary)

I study the spin waves propagation in ferrimagnetic yttrium iron garnet thin films. I also study about different control mechanism to control the spin waves.

### 2. 実験(Experimental)

#### **【利用した主な装置】**

ナノプローバ[N-6000SS]

#### **【実験方法】**

Perform SEM observation while applying voltage to the 3-layer structure element in which PEDOT:PSS is sandwiched between Au and Pt electrodes. Fig. 1(b).

### 3. 結果と考察(Results and Discussion)

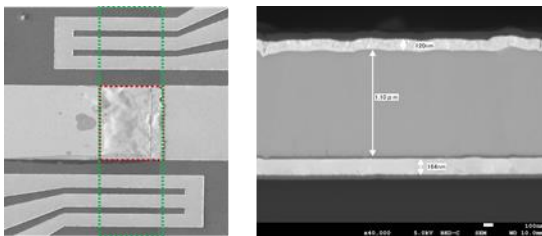


Figure 1(a) surface SEM image of magnon FET. (b) cross section of polymeric gate stack.

We have used coplanar waveguide antenna to excite and detect the spin waves (SWs). In the subsequent step we have fabricated a organic polymeric gate on the SWs propagation paths. We have applied voltage across the organic polymeric gate to control the SWs. Second figure (Fig. 1(b)) shows the cross section of Organic polymeric gate. We have successfully demonstrated the SWs control by polymeric gate. However, the exact mechanism is still under investigation based on the cross section analysis of polymeric gate. We have investigated the change or polarization upon the application of the

voltage across the PEDOT:PSS in the NPF at JAIST. However, the observation in the SEM is not conclusive for explaining the main results of spin waves modulation.

### 4. その他・特記事項(Others)

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#### Reference.

#### Journals (Peer reviewed):

- (1) Appl. Phys. Lett. 117, 152403 (2020)
- (2) AIP Advances 10, 015015 (2020)
- (3) IEEE Trans. On Mag., Early access (2021)
- (4) Appl. Phys. Lett., 119(8) 082402(1-6) (2021)
- (5) Sensitivity enhancement in magnetic sensor using CoFeB/Y<sub>3</sub>Fe<sub>5</sub>O<sub>12</sub> resonator (Submitted)

#### Conference Presentation:

- (1) Multifrequency Spin Wave Device for Parallel Data Processing Using Micro Structured Yttrium Iron Garnet Thin Films, M. Sarker, S. Nakamura, H. Yamahara, M. Seki and H. Tabata; INTERMAG21, Web meeting, 2021.4.26
- (2) Multichannel magnon propagation in Microstructured YIG; M. Sarker, S. Nakamura, H. Yamahara, M. Seki and H. Tabata; PASPS 26
- (3) Electrically tunable magnon FET, M. Sarker, S. Nakamura, H. Yamahara, M. Seki and H. Tabata, Spin-RNJ meeting

### 5. 論文・学会発表(Publication/Presentation)

None.

### 6. 関連特許(Patent)

No patent yet