CROSS TOKAI Experimental Report J-PARC	承認日 Date of Approval 2017/4/7 承認者 Approver Kaoru Shibata 提出日 Date of Report 2016/12/30
課題番号 Project No. 2016A0318 実験課題名 Title of experiment Direct measurement of spin current created by ultrasound in $Y_3Fe_5O_{12}$ 実験責任者名 Name of principal investigator Shin-ichi Shamoto 所属 Affiliation Japan Atomic Energy Agency	装置責任者 Name of responsible person Kaoru SHIBATA 装置名 Name of Instrument/（BL No.） DNA(BL-02) 実施日 Date of Experiment 2016/12/15, 09:00-12/21, 9:00

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。（適宜、図表添付のこと）
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

A single crystal of $Y_3Fe_5O_{12}$

2. 実験方法及び結果（実験がうまくいかなかった場合、その理由を記述してください。）
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

A single crystal of $Y_3Fe_5O_{12}$ (YIG) grown along [001] axis by traveling solvent floating zone method was measured under a magnetic field of about 0.1-0.3 T at a magnetic Bragg peak position, (220), with and without longitudinal ultrasound propagating along the [001] axis. The YIG crystal has a cylindrical shape with about 5.5 mm diameter and 16 mm length. The integrated intensity was increased with increasing applied voltage on a $LiNbO_3$ transducer, as shown in Fig. 1. At the same time, the crystal temperature was increased by the induced power (Fig. 2). The frequency dependence is also studied at the ultrasound resonating points, which are frequencies multiplied by odd numbers to basic frequency 34 MHz. The intensity decrease is observed above 187 MHz in Fig. 3. This decrease is attributed to the power loss of ultrasound electronic circuit around the crystal. One possible origin would be emission of electric wave from electric terminals. Based on these basic measurements, we measured the crystal under 112 MHz and 5 V, in order to reduce the crystal heating.

2. 実験方法及び結果（つづき） Experimental method and results (continued)

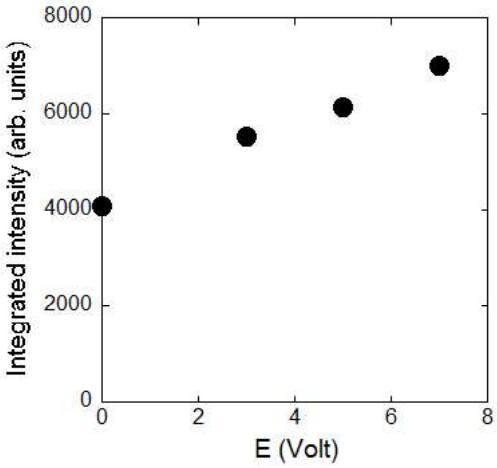

Fig. 1. Integrated Bragg peak intensity at (220) under ultrasound as a function of applied voltage.

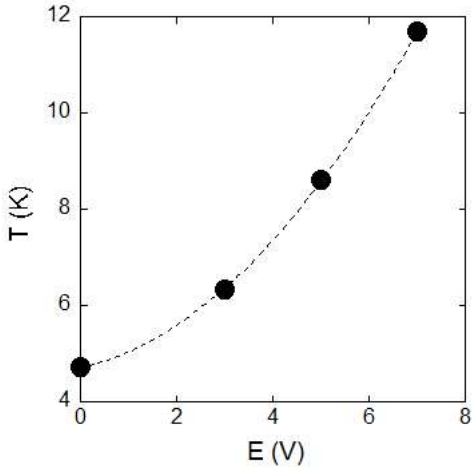

Fig. 2. Sample temperature as a function of applied voltage.

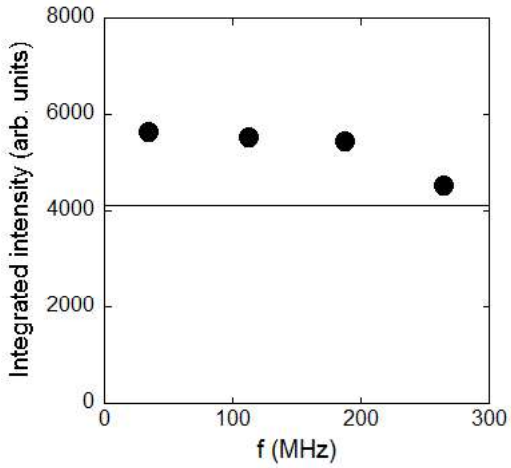

Fig. 3. Frequency dependence of integrated Bragg peak intensity at (220).