

Fabrication and properties of InSb films with ion-beam sputtering for use in the amplification of magneto-surface-acoustic-wave

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The magnetic surface wave (MSAW)[1] device is possible to manipulate phase velocity by an external magnetic field. However the MSAW is attenuated largely at the high frequency over MHz. Therefore, we proposed novel magneto-electro-mechanical device amplified MSAW having the amorphous $\text{Fe}_{80}\text{B}_{20}$ / InSb / LiNbO_3 hybrid structure. This device is utilized amplification of surface acoustic wave by the interaction between surface acoustic wave and the carrier in semiconductor InSb. In this study, we investigated InSb films for amplification of SAW by an electron bunching.

The InSb thin film was deposited on a 128 degree Y-cut, X-propagation LiNbO_3 substrate by dual ion beam sputtering. Then we annealed the samples under vacuum condition from 330 °C to 605 °C as shown in Fig.1. After annealing at 605 °C for 30 minutes, the InSb thin film with an HALL mobility of 3560 cm^2/Vs was obtained. We observed a SAW of 125 MHz to fabricate an interdigital transducer (IDT) with a strip width of 8 μm by photolithography. The detail of amplification of SAW is presented at the conference.

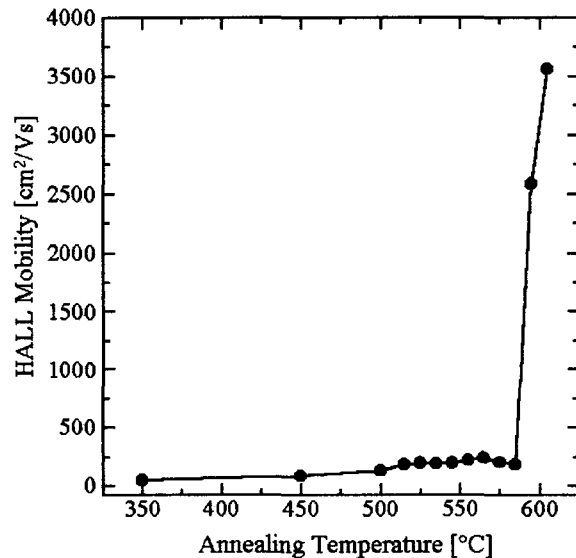


Fig.1 Relation between the Hall mobility and the annealing temperature.

References

- [1] N. Yokokawa, S. Tanaka, M. Inoue and T. Fujii, Jap. J. Appl. Phys., **Suppl. 30-1**, 182 (1991).