

課題番号 : F-15-NU-0084
利用形態 : 機器利用
利用課題名(日本語) :
Program Title(English) : Magnetic Sensor Fabrication
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1. 概要(Summary)

The micro process of a mono-bridge 3-D magnetic field sensor was developed. The sensor detects magnetic field strength in three directions perpendicular to each other. In this experimental run, micro process was established. The device was formed. However, issues of edge roughness remains, which results in inter layer shorting.

2. 実験(Experimental)

【利用した主な装置】

両面露光用マスクアライナ、8元マグネトロンスパッタ装置、3元マグネトロンスパッタ装置、レーザー描画装置、ECR-SIMS エッチング装置

【実験方法】

Mask fabrication is done with laser lithography. Use 5-source sputter system to fabricate AMR multilayer film and micro process to form magnetic field sensing element. An insulating layer and a top magnetic setting coil were added on the top of the sensing element. Optical and electric testing was performed finally.

3. 結果と考察(Results and Discussion)

The mono-bridge AMR magnetic sensor was formed by micro process as shown in Fig. 1. The layer contains the first layer of AMR sensing strips on the bottom, the second layer of conductive metal wiring and barber-pole structure, the third insulating layer, the fourth magnetic setting coil layer on the top. The patterning of each layer was formed; however, the edge roughness of the patterns is very large. The edge roughness of

conductive metal results in interlayer electrical short between the magnetic sensor and magnetic sensing coil. The same roughness of insulating layer causes magnetic coil opening. The roughness results from the positive photo resist rounding induced by the process of exposing and developing. When thin films deposited on the rounded sidewall of the developed photo resist, edge fans forms. A way to solve this issue is using negative photo resist combined with over exposure to form undercut at the bottom of the pattern. The undercut of photo resist prevents the formation of edge fans after lift-off process.

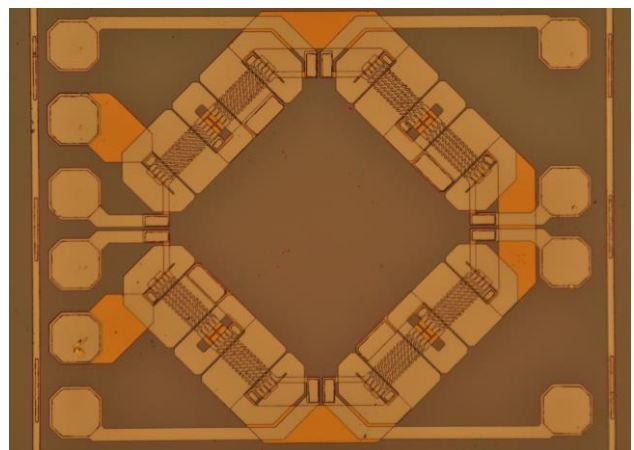


Fig. 1 Microscopic image of mono-bridge 3D AMR magnetometer.

4. その他・特記事項(Others)

None.

5. 論文・学会発表(Publication/Presentation)

None.

6. 関連特許(Patent)

None.