課題番号　:F-18-TU-0104
利用形態　:機器利用
利用課題名（日本語）　:圧電 MEMS アクチュエータ
Program Title (English)　:Piezoelectric MEMS actuator
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キーワード／Keyword　:成膜・膜堆積, PZT, Ion Implantation, Piezoelectric actuator, Piezoresistive sensor

1. 概要（Summary）

Evaluation of PZT thin film/piezoresistive sensor fabrication compatibility, in order to develop a PZT thin film MEMS actuator enhancement through using integrated piezoresistive sensor for feedback control.

2. 実験（Experimental）

【利用した主な装置】

中電流イオン注入装置, ゾルゲル自動成膜装置

【実験方法】

Boron light and heavy doping was done on SOI wafer to form sensors. P was implanted on top of light B area to form Buried Piezo Resistors. Then PZT film (less than 2 μm) was formed by sol-gel deposition on samples with LPCVD SiO_2/SiN/SiO_2 and thermal SiO_2 insulation layer. SIMS analysis was done to evaluate effect of PZT deposition on doping profile.

3. 結果と考察（Results and Discussion）

PZT could not be deposited successfully on sample with LPCVD SiO_2 (too many cracks). So, only thermal SiO_2 sample was analyzed.

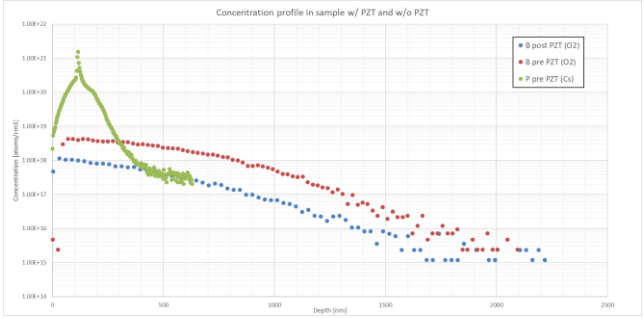

Fig. 1 SIMS analysis of B and P profiles.

A result of SIMS analysis is shown in Fig. 1. There were no readings of P doping on post-deposition sample, and B concentration profile is lower, based on chart. However, the surface post-deposition is not clearly identified and is suspected that during PZT and bottom electrode (Pt) removal process, the substrate doped with P was removed as well.

Thus, data is regarded as inconclusive and further analysis is required.

4. その他・特記事項（Others）

References

M. Esashi et al., Sensors and Actuators, Vol. 4 (1983), pp 537-544.

M. Moriyama et al. 異なる市販ゾルを用いたゾルゲル法による PZT 薄膜の成膜と評価, IEEJ (2015).

T. Tsukamoto et al., Journal of Micromechanics and Microengineering 2017, Vol. 27, No. 9

5. 論文・学会発表（Publication/Presentation）

なし。

6. 関連特許（Patent）

なし。