※課題番号 : F-12-WS-0048
※支援課題名（日本語） : 薄膜永久磁石駆動集積マイクロポンプの研究
※Program Title（in English） : Integrated Micro Pumps Actuated by Thin Film Permanent Magnet
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※概要（Summary ）:

We examine a batch fabrication method which enables the polydimethylsiloxane (PDMS) diaphragm integration with a sputtered thin film permanent magnet (TFPM). The TFPM, consisting of 300nm thick NdFeB layer and 10nm thick Ta layer deposited sequentially, attains high magnetic performance. However, the high sputtering temperature disables the TFPM direct deposition on the PDMS diaphragm. The proposed process is to firstly sputter TFPM on Si substrate, followed by coating with PDMS, and then etch silicon using XeF_2

※実験（Experimental）:

We sputtered thin film permanent magnet with the sputtering machine SPC350. And then, we used the XeF_2 etching machine to etch silicon. We finally etched 200μm thick silicon within 3 hours.

※結果と考察（Results and Discussion）:

After etching silicon using XeF_2. The evaluation of the magnetic diaphragm shows that PDMS and TFPM keep not only the profile, but also mechanical and magnetic properties. This fabricated magnetic diaphragm using MEMS process is compatible for batch fabrication.

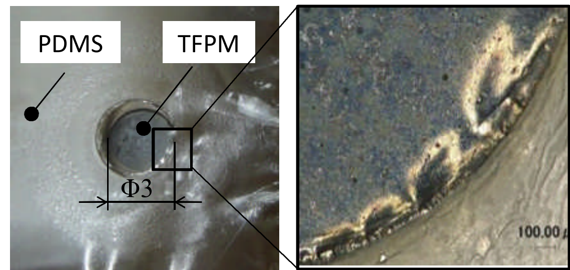

Fig. PDMS diaphragm after removing silicon substrate

※その他・特記事項（Others）:

なし。

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論文・学会発表（Publication/Presentation）:

Chao Zhi, Tadahiko Shinshi, Minoru Uehara, Akihiro Matsutani, Isamu Yuito, Teruaki Takeuchi: “Fabrication and Evaluation of a Polydimethylsiloxane Diaphragm Integrated with a Sputtered Thin Film Permanent Magnet” to be published in Applied Physics Express.

関連特許（Patent）:

なし。