

課題番号 : F-19-KT-0157
 利用形態 : 機器利用、技術補助
 利用課題名(日本語) : PECVD-DLC 傾斜多層膜を被覆した Si 微小構造体の引張強度特性
 Program Title(English) : Tensile behaviors of micron-scaled silicon structure fully coated with bias-graded DLC multi-layer deposited by PECVD
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 キーワード/Keyword : N&MEMS、信頼性、成膜・膜堆積、DLC、表面処理

1. 概要(Summary)

DLC (Diamond Like Carbon) film is one of the promising coating material in MEMS industry deal to its many desirable properties. The bias-graded deposition by changing bias voltage stepwisely is an effective solution to release the internal stress. The modification of the interface regions between the substrate and the graded layers ensures a good adhesion. In this research, The tensile testing was carried on a micro-scaled Si structure which was fully coated by DLC film with different bias-graded types by PECVD method.

2. 実験(Experimental)

【利用した主な装置】

- [A2] I-line Stepper
- [A54] Double-side mask aligner
- [B8] Deep Reactive Ion Etching machine
- [C22] Nano-indentation machine

【実験方法】

Tensile specimens were fabricated using SOI wafer. Upper and lower side photolithography were carried out by stepper and double-side mask aligner while the deep RIE machine was used for silicon trench etching from the both sides (Fig. 1). PECVD was used for the full-coated gradient DLC film at the fabricated specimens. The fracture toughness was measured by nano-indentation method.

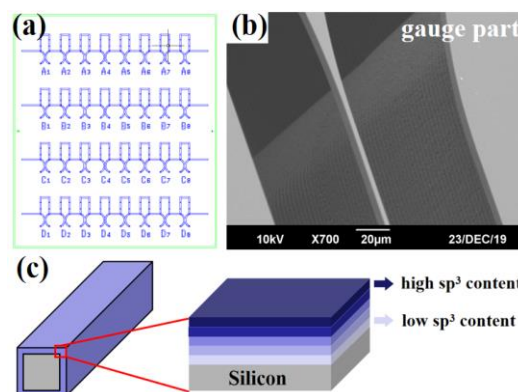


Fig.1 Sample fabrication

3. 結果と考察(Results and Discussion)

A summary of average tensile strengths is shown in Figure 2. Compared with single layer, coating parameter with 200/400/600 showed a much higher strength.

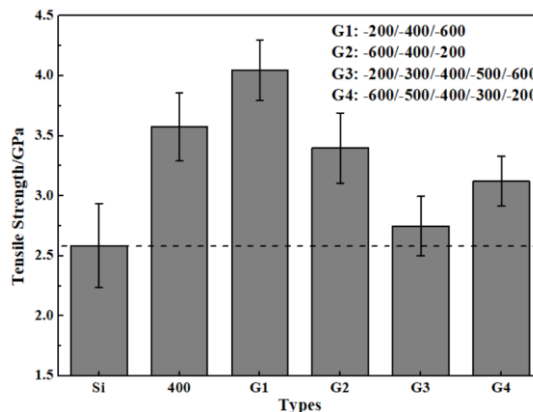


Fig.2 Average tensile strength

- 4. その他・特記事項(Others) なし
- 5. 論文・学会発表(Publication/Presentation) なし
- 6. 関連特許(Patent) なし