

利用課題番号 : F-15-KT-0102  
 利用形態 : 技術補助  
 利用課題名(日本語) : DLC 薄膜でコーティングしたシリコンマイクロ構造の引張試験  
 Program Title (English) : Tensile testing of silicon microstructure coated with nano-scaled DLC film  
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1. 概要(Summary) :

The silicon material has been widely accepted for its low cost and well-established processing technologies. In order to improve its mechanical reliability, we are investigating DLC coating on silicon microstructures. In this experiment, single crystal silicon specimens for DLC coating are fabricated.

2. 実験(Experimental) :

2.1 Machine used

[A3] Laser direct writing system

[A54] Double-side mask aligner

[B8] Deep reactive ion etching machine

2.2 Experiment Method

Single crystal silicon (SCS) specimens were fabricated using silicon-on-insulator (SOI) wafer (the device layer: 5 μm thick). The SCS specimen surface is (100) and its tensile axis is <110>. The double side aligner was used for the upper and lower side photolithography while the Deep RIE machine was used for silicon trench etching from the both sides (Fig. 1).

PECVD was used for the full-covered DLC coating at the fabricated single crystal silicon specimens with different deposition bias. The deposition time was fixed to 1 min and thickness is around 150 nm.

3. 結果と考察(Results and Discussion) :

Fig.2 shows fabricated SCS specimens with and without DLC coating. The thinnest bar in the figure is the tensile part and the thickness of the coating seemed to be conformal. Moreover, even though the

DLC film has a quite large residual stress and may cause the fracture, by adopting the fully covered coating, no fracture happened in the tensile part.

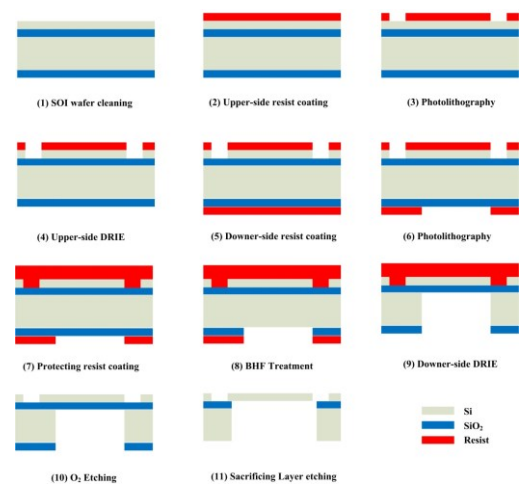


Fig.1 Fabrication process

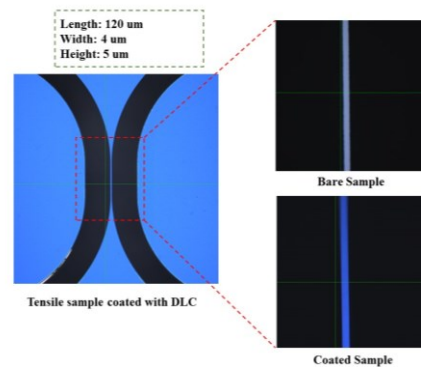


Fig.2 SCS specimens before and after DLC coating.

4. その他・特記事項(Others) :

Future plan:

The tensile testing on bare Si specimen and DLC coated specimen will be performed.

5. 論文・学会発表(Publication/Presentation) :

None.

6. 関連特許(Patent) :

None.