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 利用形態 : 技術補助
 利用課題名(日本語) : ナノシリコンワイヤ型熱電発電デバイスに関する作製と研究
 Program Title (English) : Development of silicon nanowire-based thermoelectric generator
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 キーワード/Keyword : ナノエレクトロニクス、成膜・膜堆積、スピンのコーティング、層間絶縁膜、熱伝導率

1. 概要(Summary)

In order to suppress the heat losses in thermoelectric power generation devices, the interlayer insulating films with low thermal conductivity need to be fabricated and verified. This time, a kind of SiO₂ film with low thermal conductivity was formed by spin coating.

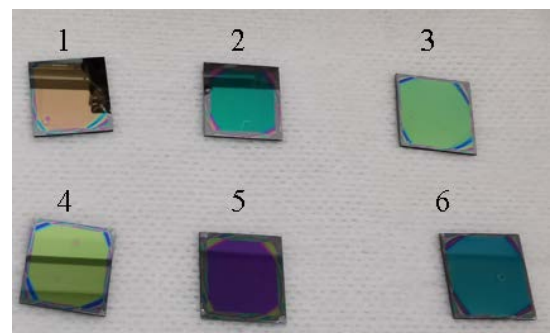


Figure 1) Pictures of SiO₂ film fabricated by different rotation speed (1), (2), and (3) and different heat treatment (4), (5), (6).

2. 実験(Experimental)

【利用した主な装置】

ダイシングソー “DAD322”

ウェハ RTA 装置 “AccuThermo 610”

【実験方法】

Perhydropolysilazane (PHPS) is used to fabricate the SiO₂ film with low thermal conductivity by spin coating at different rotation speed. Then the films are annealed in N₂ at 400°C for 30 min. The prepared samples are as follows:

- (1)2000 rpm (2)3000 rpm (3)4000 rpm
- (4)2000 rpm annealing
- (5)3000 rpm annealing
- (6)4000 rpm annealing

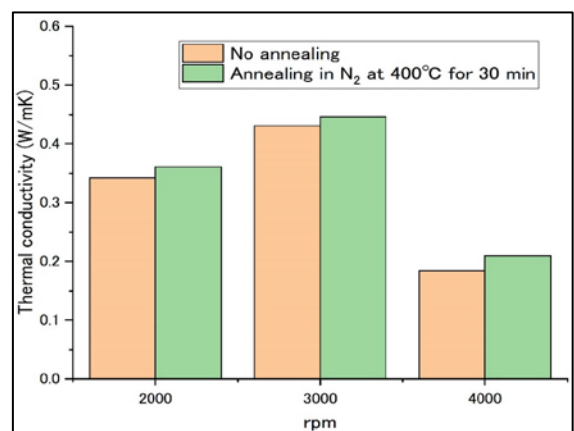


Figure 2) Thermal conductivity of each sample

3. 結果と考察(Results and Discussion)

The prepared sample is shown in Figure 1. Then the thermal resistance was obtained by FDTR / ω method, and the thickness was observed by SEM in Waseda university, finally the thermal conductivity of each sample was calculated which is shown in Figure 2.

All the thermal conductivities of the films are below 0.5 W/mK. It is found that due to the fast rotation speed at 4000 rpm, there is a gap between the SiO₂ film and Si-substrate which results the thermal conductivity of SiO₂ film at 4000 rpm is the lowest.

4. その他・特記事項(Others)

他の機関の利用: 早稲田大学・ナノ・ライフ創新研究機構

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

6. 関連特許(Patent) なし