

課題番号 : F-15-UT-0008
利用形態 : 機器利用
利用課題名(日本語) :
Program Title (English) : CNT-silicon solar cells
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1. 概要(Summary)

Single-walled carbon nanotubes (SWNTs) have been a promising candidate material for Si solar cell applications due to its tunable band gap, high electrical conductivity and optical transmittance, as well as chemical stability and earth abundance. In this research, we fabricate the SWNT-Si solar cell to maximize its performance.

2. 実験(Experimental)

【利用した主な装置】

光リソグラフィ装置 MA-6

【実験方法】

N-type Si substrate with 100 nm SiO₂ layer on both sides was etched by buffered HF in the fume hood of Takeda super clean room. Then the back side of Si substrate was deposited with Ti and Pt by the sputter machine in our lab. Subsequently, the top side was spin-coated by photoresist in Takeda super clean room. Then the photoresist was exposed by MA6 Suss 6" mask aligner to make patterns. After that, the top side was deposited with SiO₂ and Ti/Pt by the sputter machine in our lab. Finally, in our lab, after lift-off process of the remaining photoresist on active window, SWNT film was transferred onto the window to measure the performance of solar cell.

3. 結果と考察(Results and Discussion)

SiO₂ layers on Si substrate was etched fully by buffered HF solution. The active window was

successfully covered by photoresist and avoided the deposit of SiO₂. The electrodes are deposited with enough adhesion force. After the lift-off process, active window was successfully exposed to be ready for the transfer of SWNT film. The as-fabricated SWNT-Si solar cell as shown in Fig. 1 successfully gave power conversion efficiency under the illumination of light.

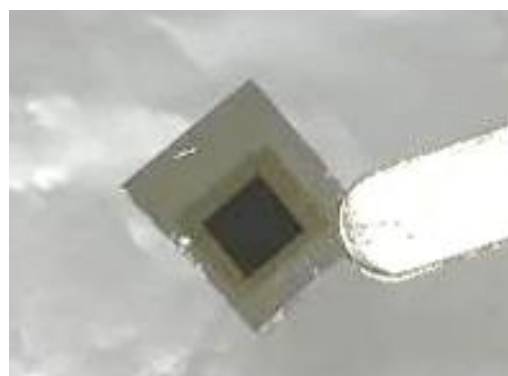


Fig. 1: As-fabricated SWNT-Si solar cell.

4. その他・特記事項(Others)

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5. 論文・学会発表(Publication/Presentation)

(1) Y. Qian et al., FNTG 学会第 49 回大会, 平成 27 年 9 月 8 日.

6. 関連特許(Patent)

なし