

Fabrication of Si/C/SiNW arrays sandwich structure at Different Annealing Parameters for Solar Cell Application

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A Si/C/SiNW arrays sandwich structure has been fabricated by RF magnetron sputter. The effect of the RTA parameters on the structure, element, hydrophilic-hydrophobic and electrical property of the Si/C/SiNW arrays were studied. The XRD patterns of Si/C/SiNW arrays annealing at different time that clearly show that all structures have an amorphous phase. In this study, a PIN solar cells using titanium dioxide and Si/C/SiNW arrays sandwich structure hybrid. A Si/C/SiNW arrays with un-annealing was relatively hydrophobic with a contact angle of ca. $8.42 \pm 4.42^\circ$. Heat treatment of the Si/C/SiNW arrays resulted in a substantial and statistically significant increase in surface hydrophobic, which was manifested by a dramatic enhancement of the contact angle to ca. $124.83 \pm 2.18^\circ$. Raman scattering study of Si/C/SiNW arrays exhibited a development of the relative intensity of the D and G band with increasing of the annealing temperature. The present results indicated that the power conversion efficiency (PCE) of the sandwich structure without annealing treatment is superior to that of the annealed solar cells. The PIN solar cells used Si/C/SiNW arrays sandwich structure before annealing, in which the V_{oc} is of 0.046mV and efficiency is of $1.13 \times 10^{-3}\%$.

Key words: RTA treatment, RF Magnetron Sputtering,