



Original research article

Photovoltaic properties enhancement of solar cell based on porous silicon



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ABSTRACT

Photoelectrochemical and electrochemical etching of conventional silicon solar cells of various thicknesses was conducted to the synthesis nanostructured solar cell of higher conversion efficiency. It is found that the conversion efficiency of the solar cell synthesized with the help of laser beam is higher than those etched electrochemically. The Atomic Force Microscope & Scanning Electron Microscope images imply that the pore diameter decreases from 40 μm using 530 nm laser wavelength to 15 μm when 405 nm wavelength was employed. The best hydrofluoric acid concentration to produce higher efficiency was 20%. Image analysis has been carried out to characterize the microstructured surface using computer software.

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1. Introduction

The potential demand of efficient solar cell has been stimulated researchers to develop various methods and techniques compared to solar cell last decade. One of the most popular solar cells rules the market is the photovoltaic solar cell. Currently, the main challenge concerns producing high efficiency photovoltaic exceed 12% [1,2]. Surface reconstruction of conventional silicon solar cell could drastically modify the optical, electrical and consequently the conversion efficiency of the solar cell. The enhancement of the conversion efficiency is attributed to the large surface area of the porous layer which helps sunlight trapping [3].

Conventional solar cells represent the first generation of conventional solar cells. This type of solar cells suffered from some limitations such as low conversion efficiency and high manufacturing cost. However, such limitations can be overcome when the cell surface textured to a large surface area [4]. Nanostructured solar cells based on the ordinary *p-n* junction could provide many interesting features represented by enhancement the conversion efficiency and reduction of the maintenance requirements, as well [5]. Inexpensive solar cells, which would utilize nanotechnology are considered as a renewable energy source that would preserve the environment due to the pollution reduction [6].

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