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Data Article

Optical properties and impedance spectroscopy analyses for microscale Si pillar solar cells

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ABSTRACT

In this data article, optical properties and impedance spectroscopy analyses were applied for the 5 μm-height pillar Si solar cells to analyzed the insight of the Si geometric effect (Yadav et al., 2017) [1]. The surface reflectance data measured for all Si pillar samples (Fixed height of 5 μm with varying width and period. Geometric features of Si pillars are summarized in Table 1) are presented. Statistical data after analysis are summarized in the table, to profile the integrated reflectance quantitatively. Impedance spectroscopy analyses of all the samples were performed to demonstrate the bias-dependent space charge region. Mott–Schottky investigation shows the enhancement of built-in potential values due to the pillar structures.

Specifications Table

Subject area	*Physics, Electrical Engineering*
More specific subject area	*Solar cells*
Type of data	*Figures, Table*
How data was acquired	*UV-visible spectrophotometer (UV-2600, Shimadzu), Potentiostat/Galvanostat (ZIVE SP1, WonA Tech, Korea)*

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Data format	*Analyzed*
Experimental factors	*Optical Reflectance: 5 μm-height pillar Si solar cells* *Impedance spectroscopy: Frequency range 1 MHz to 1 Hz* *Bias range → –0.7 V to 0.4 V in step of 0.1 V* *Mott-Schottky: Frequency → 20 kHz* *Bias range → –0.8 V to 0.4 V*
Experimental features	*Realizing high-performing Si solar cells by using periodic structures*
Data source location	*Incheon National University, Incheon-406772, Korea*
Data accessibility	*The data are with this article*

Value of the data

- Area under the curve of reflectance of the Si microscale pillar solar cells would be useful to estimate the overall reflectance quantitatively; this analysis could be applicable to efficient anti reflectance coating researches.
- The bias dependent impedance spectra revealed the functional modulation of the space charge region of Si pillar solar cells.
- The Mott–Schottky measurement demonstrates the enhanced built-in potential according to the pillar structures.

1. Data

Fig. 1 shows surface reflectance of various microstructured Si solar cell, recorded by diffused integrated sphere UV-visible spectrophotometer. Microstructure Si samples are well detailed in our report [1]. Table 1 shows the integrated area under the curve of reflectance profiles. Impedance

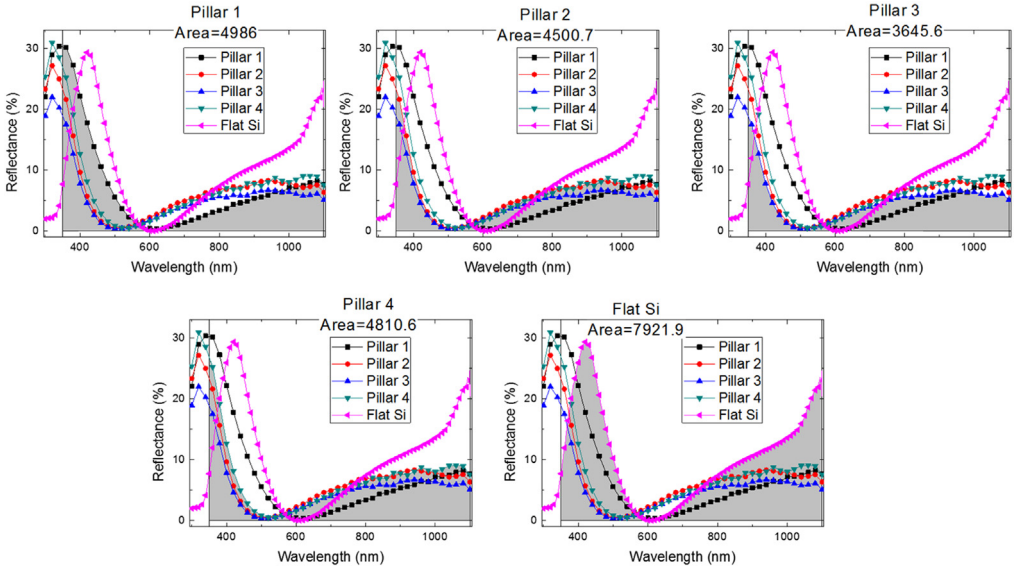

Fig. 1. Reflectance profiles microstructure Si solar cells. Area was integrated for the photon wavelength range from 350 nm to 1100 nm. Solid gray region is shown for integration function.