Highly Conformal Ni Micromesh as a Current Collecting Front Electrode for Reduced Cost Si Solar Cell - DTU Orbit (27/03/2019)

Highly Conformal Ni Micromesh as a Current Collecting Front Electrode for Reduced Cost Si Solar Cell

Despite relatively high manufacturing cost, crystalline-Si solar cell continues to hold promising future due to its high energy conversion efficiency and long life. As regards cost, one pertinent issue is the top electrode metallization of textured cell surface, which typically involves screen printing of silver paste. The associated disadvantages call for alternative methods that can lower the cost without compromising the solar cell efficiency. In the present work, a highly interconnected one-dimensional (1D) metal wire network has been employed as front electrode on conventional Si wafers. Here, for the first time, we report an innovative solution based crackle templating method for conformal metal wire network patterning over large textured surfaces. Laser beam induced current mapping showed uniform photocurrent collection by the electrodes without any shadow losses. With electroless deposition of Ni wire network on corrugated solar cell, a short circuit current of 33.28 mA/cm² was obtained in comparison to 20.53 mA/cm² without the network electrode. On comparing the efficiency with the conventional cells with screen printed electrodes, a 20% increment in efficiency has been observed. Importantly, the estimated manufacturing cost is at least two orders lower.

General information
State: Published
Pages: 8634-8640
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: A C S Applied Materials and Interfaces
Volume: 9
Issue number: 10
ISSN (Print): 1944-8244
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 8.15 SJR 2.784 SNIP 1.543
Web of Science (2017): Impact factor 8.097
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 7.6 SJR 2.561 SNIP 1.536
Web of Science (2016): Impact factor 7.504
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 7.38 SJR 2.262 SNIP 1.555
Web of Science (2015): Impact factor 7.145
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 6.88 SJR 2.125 SNIP 1.636
Web of Science (2014): Impact factor 6.723
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 6.05 SJR 1.992 SNIP 1.548
Web of Science (2013): Impact factor 5.9
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 4.94 SJR 2.199 SNIP 1.327
Web of Science (2012): Impact factor 5.008