Sensing amorphous/crystalline silicon surface passivation by attenuated total reflection infrared spectroscopy of amorphous silicon on glass *

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Received March 1, 2019
Revised March 1, 2019
Accepted March 25, 2019

Attenuated total reflection Fourier transform infrared (ATR FTIR) spectroscopy and effective lifetime measurements have been used to characterize amorphous/crystalline silicon surface passivation in silicon heterojunction solar cells. The comparative studies show a strong link between microstructure factor R^* and effective lifetime of amorphous silicon (a-Si:H) passivation layers incorporating an interface buffer layer, which prevents the epitaxial growth. It is demonstrated that thin a-Si:H films deposited on glass can be used as ATR substrates in this case. The obtained results show that a-Si:H films with R^* close to 0.1 are required for manufacturing of high-efficiency ($> 23\%$) silicon heterojunction solar cells.

DOI: 10.21883/FTP.2019.08.48008.9113

* Полный текст статьи опубликован в переводной версии журнала „Физика и техника полупроводников“ — SEMICONDUCTORS (Т. 53. Вып. 8).