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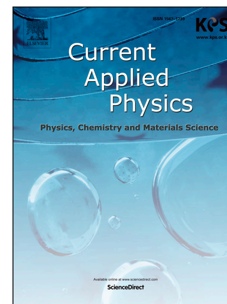

Microscopic aspects of potential-induced degradation phenomena and their recovery processes for p-type crystalline Si photovoltaic modules

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Microscopic aspects of potential-induced degradation phenomena and their recovery processes for p-type crystalline Si photovoltaic modules

Atsushi Masuda[a], Minoru Akitomi[b], Masanao Inoue[b], Keizo Okuwaki[c], Atsuo Okugawa[c], Kiyoshi Ueno[d], Toshiharu Yamazaki[d] and Kohjiro Hara[b]

[a]Research Center for Photovoltaics, National Institute of Advanced Industrial Science and Technology, Central 2, 1-1-1, Umezono, Tsukuba, Ibaraki 305-8568, Japan
[b]Research Center for Photovoltaics, National Institute of Advanced Industrial Science and Technology, 807-1, Shuku-machi, Tosu, Saga 841-0052, Japan
[c]Kikusui Electronics Corporation, 1-1-3, Higashi-Yamata, Tsuzuki-ku, Yokohama, Kanagawa 224-0023, Japan
[d]Choshu Industry Co., Ltd., 3740, Shin-Yamanoi, Sanyo Onoda, Yamaguchi 757-8511, Japan

Abstract

Processes for potential-induced degradation (PID) and recovery phenomena were characterized using p-type multicrystalline Si photovoltaic modules and by PID test method using Al plate. Very severe PID phenomena accompanied with a drastic reduction in both open-circuit voltage and shunt resistance were observed within only several hours. It was found that PID phenomena are strongly accelerated at higher temperature and under higher negative-voltage application, on the other hand, PID phenomena do not necessarily require high humidity in this test method using Al plate. Na diffusion from the cover glass to the Si cell was observed after PID test. Recovery process from PID was also observed by applying positive voltage. However, complete recovery of photovoltaic performances was observed at room temperature in the dark without positive-voltage application for test modules with PID although recovery process requires a few hundred days.

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