

CHEMICAL ETCHING BASED ENHANCEMENT OF GRAIN BOUNDARIES RECOMBINATION VELOCITY IN MULTICRYSTALLINE SILICON SOLAR CELLS

W. DIMASSI, M. BOUAÏCHA, H. NOURI, B. BESSAÏS, H. EZZAOUIA, R. BENNACEUR,

Laboratoire de Photovoltaïque et des Semiconducteurs, Institut National de Recherche Scientifique et Technique,
B.P. 95, 2050 Hammam-Lif, Tunisia.

Electrical properties of grain boundaries (GBs) in multicrystalline silicon (mc-Si) solar cells can be enhanced by several techniques. To reach this target, we groove the GBs using a chemical etching method using a HF/HNO₃ solution. Thus the areas of these highly recombining zones were reduced. After achieving phosphorus diffusion and metallic contacts, the I-V characteristics, measured at the dark and at AM1.5 (Fig. 1), show an enhancement of the electrical properties of the grooved cells compared to untreated ones. When we performed the Light-Beam-Induced-Current (LBIC) measurements around some GBs, we noticed an improvement of the GBs recombination velocity (Fig. 2). We attributed these electrical and electronic properties enhancements of the grooved cells to deep penetration of phosphorus and metallic contacts in the grooved grain boundaries regions.

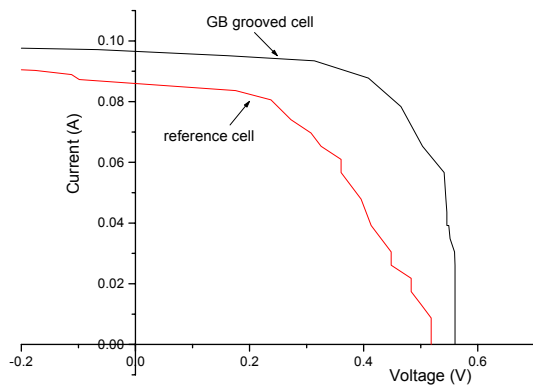


Fig. 1. I-V characteristics at AM 1.5 illuminations of as made untreated cell (ref) and grooved cell

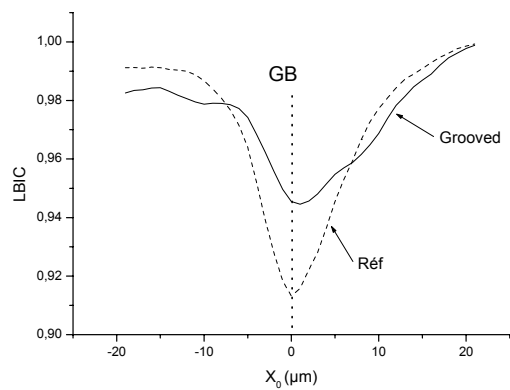


Fig. 2: LBI-Current around a grain boundary before and after grooving

TOPICS + KEYWORDS: Solar cells, multicrystalline silicon, grain boundaries, recombination velocity, passivation.