

Rapid Photothermal Processing for Silicon Solar Cells Fabrication

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Abstract

In our report we demonstrated the advantage of the rapid photothermal processing (RPP) technology compare to conventional furnace technology for solar cells fabrication: short time, low thermal budget and low temperature processing, high heating-cooling rates. The n⁺-p-Si junctions were obtained from electrochemical deposited P source by rapid photothermal processing enhanced diffusion for 16 s at 900 degC and 1000 degC. The emitter sheet resistivity decreased from 1100 Omega/sq, RPP duration 60 s to 340 Omega/sq, RPP duration 200s at 999 degC. The concentration profiles of P in Si after RPP enhanced diffusion were analyzed. The regime of emitter ohmic contact formation is RPP at 310 degC for 8-10s. The photoelectrical parameters of the obtained n⁺-p and p⁺-n-Si photovoltaic cell are respective FF=33%, =4.1% and FF=40%, =1.1%. The obtained results demonstrated that all steps of the n⁺-p and p⁺-n Si solar cells fabrication can be realized by the rapid photothermal processing technology.

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