

## Accepted Manuscript

Optical and electrical characterization of crystalline silicon films formed by rapid thermal annealing of amorphous silicon

Christopher Baldus-Jeursen, Roohollah Samadzadeh Tarighat, Siva Sivoththaman

PII: S0040-6090(16)00038-9  
DOI: doi: [10.1016/j.tsf.2016.01.025](https://doi.org/10.1016/j.tsf.2016.01.025)  
Reference: TSF 34964

To appear in: *Thin Solid Films*

Received date: 9 July 2015  
Revised date: 14 December 2015  
Accepted date: 14 January 2016



Please cite this article as: Christopher Baldus-Jeursen, Roohollah Samadzadeh Tarighat, Siva Sivoththaman, Optical and electrical characterization of crystalline silicon films formed by rapid thermal annealing of amorphous silicon, *Thin Solid Films* (2016), doi: [10.1016/j.tsf.2016.01.025](https://doi.org/10.1016/j.tsf.2016.01.025)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Optical and Electrical Characterization of Crystalline Silicon Films Formed by Rapid Thermal Annealing of Amorphous Silicon

Given name: Christopher      Surname: Baldus-Jeursen<sup>\*</sup>

Given name: Roohollah      Surname: Samadzadeh Tarighat<sup>†</sup>

Given name: Siva      Surname: Sivoththaman<sup>‡</sup>

Department of Electrical and Computer Engineering, University of Waterloo, 200 University Avenue West, Waterloo, Ontario, Canada, N2L3G1

**Abstract:** The effect of rapid thermal annealing (RTA) on n-type hydrogenated amorphous silicon (a-Si:H) films deposited on silicon wafers was studied by electrical and optical methods. Deposition of a-Si:H films by Plasma Enhanced Chemical Vapor Deposition (PECVD) method was optimized for high deposition rate and maximum film uniformity. RTA processed films were characterized by Spreading Resistance Profiling (SRP), Hall effect, Spectroscopic ellipsometry (SE), defect etching and Transmission electron microscopy (TEM). It was found that the films processed between 600°C and 1000°C were highly crystalline and that the defect density in the films diminished with increasing thermal budget. Junctions formed by the RTA processed n-type a-Si:H films on p-type Si wafers were tested for device applicability. It is established that these films can be used as the emitter layer in n<sup>+</sup>p photovoltaic (PV) devices with over 14% conversion efficiency.

**Keywords:** Rapid Thermal Annealing, amorphous silicon, recrystallization, solar cells.

### 1. Introduction

---

<sup>\*</sup> Corresponding author; Email: [cjbaldus@uwaterloo.ca](mailto:cjbaldus@uwaterloo.ca) phone: +1 (519) 888-4567 x 38840

<sup>†</sup> Email: [rsamadza@uwaterloo.ca](mailto:rsamadza@uwaterloo.ca) phone: +1 (519) 888-4567 x 38840

<sup>‡</sup> Email: [sivoththaman@uwaterloo.ca](mailto:sivoththaman@uwaterloo.ca) phone: +1 (519) 888-4567

Download English Version:

<https://daneshyari.com/en/article/8033739>

Download Persian Version:

<https://daneshyari.com/article/8033739>

[Daneshyari.com](https://daneshyari.com)