Aalto University
School of Electrical Engineering

**School of Electrical Engineering**
**http://elec.aalto.fi/**
**Tel. 09 47001**
**Coordinator Marja Leppäharju**



## Notice of dissertation defense 27.06.2018

# Unraveling the link between copper impurities and efficiency losses in state-of-the-art silicon solar cells

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|---|---|
| **Title** | On the light-activation of copper impurities in crystalline silicon: root cause analysis and applications for fast high-resolution imaging |
| **Content** | Silicon is the workhorse material of a variety of semiconductor-based devices. While in integrated circuits extensive research on this material has resulted in ever-increasing levels of miniaturization, in photovoltaic applications continuous advances in crystallization processes have resulted in efficient and cost-effective solar cells. A common requirement among all applications of silicon is the demand for increasingly stringent levels of purity and crystal perfection.<br><br>This dissertation focuses on one of the most insidious metallic contaminants in silicon materials, i.e. copper, and presents a comprehensive study of a parasitic effect caused by such impurity, which is often referred to as light-induced degradation. Since this phenomenon is triggered by exposure to visible light, such parasitic effect is a particular issue in photovoltaic devices and light detectors.<br><br>This dissertation primarily aims to shed light on the root cause behind the copper-related light-induced degradation. On the base of the new knowledge acquired through these fundamental studies, this thesis work proposes an advanced algorithm for quantitatively estimating the impurity density from customary characterization measurements. As a result, copper contamination in silicon materials can be monitored and quantified during all steps of device fabrication, such that contaminated materials can be identified and excluded from manufacturing lines. |
| **Field of research** | Semiconductor Technology |
| **Doctoral candidate** | Alessandro Inglese, M.Sc. (Tech.)<br>Born in Desenzano del Garda (Italy) in 1988 |
| **Date and time** | 27.06.2018 at 12:00 |
| **Place** | School of Electrical Engineering, lecture hall AS1, Maarintie 8, Espoo |
| **Opponent** | Dr. Ronald A.Sinton, Sinton Instruments Inc., Boulder (Colorado), USA |
| **Supervisor** | Professor Hele Savin, Aalto University School of Electrical Engineering, Department of Electronics and Nanoengineering |
| **Dissertation website** | https://aaltodoc.aalto.fi/handle/123456789/53 |
| **Contact information** | Alessandro Inglese, +358 469596665, alessandro.inglese@aalto.fi |

The dissertation is publicly available on the notice board of the Aalto University Learning Hub Atrium, Maarintie 8.