Notice of dissertation defense 27.3.2018

Reducing the cost of solar electricity through better understanding of loss mechanisms

Title
Light-induced degradation due to Cu precipitation in crystalline silicon: Modeling and impact on PERC solar cells
Kuparin erkaatumisen aiheuttama valodegradaatio kiteisessä plissä: Mallinnus ja vaikutukset aurinkokennoihin

Content
Cost-competitive solar cells are required to realize carbon neutrality and international climate goals. However, material degradation that occurs upon light exposure currently impedes reaching the full potential of industrial silicon solar cells.

This thesis investigates light-induced degradation caused by copper, which is a very common metal impurity in industrial environments. The results provide quick and easy means of detecting contamination problems on solar cell manufacturing lines. In addition, simulations provide evidence on the root cause of degradation, as well as how the degradation decreases by a correct choice of material parameters.

The obtained results facilitate fast observation of contamination to avoid unnecessary delays in production. Further, the results provide material selection strategies to minimize degradation of solar cell performance. These findings contribute to the overall cost reduction target of silicon photovoltaics and promote the necessary structural transition to clean energy systems.

Field of research
Micro and Nanosciences, Silicon technology

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