

Lock-in Thermography for Investigating Solar Cells and Materials

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Since more than 10 years lock-in thermography (LIT) is being used for investigating leakage current phenomena in solar cells. In operation the p-n junction of a solar cell is forward-biased. So-called local shunts are leakage sites which are causing losses in efficiency. They may be investigated by applying a pulsed forward-bias to the cell in the dark (DLIT, typical lock-in frequency 10 Hz), where all local currents become visible as local pulsed heat sources. Such investigations allow the reliable localization of all leakage sites, which is the first step for investigating their physical nature and therefore is very helpful for optimizing the efficiency of solar cells.

In this contribution the practical realization of LIT on solar cells is described and typical results of such investigations are introduced. In the last years several special LIT techniques were developed for imaging special physical parameters of solar cells, some of them employing light irradiation (ILIT). Also non-thermal LIT techniques for imaging the minority carrier lifetime in semiconductor wafers have been developed. These special LIT techniques are introduced in the second part of this contribution. Thus, LIT meanwhile implies a whole family of techniques for investigating solar cells (also solar modules) and materials.

This paper was published in the QIRT Journal 7.2