

419 Liquid Si 2.0: Liquid Phase Deposition of Functional Silicon Layers for Cost-Effective High Efficiency Solar Cells

Project duration: from 10.2017 to 09.2020

Report submitted: 03.2021

Publishable Summary

As part of the Liquid Si 2.0 project, a new synthesis route to perhydropolysilanes was successfully developed. This synthesis route is based on the direct polymerization of monosilane (SiH_4). Compared to the prior art, which describes multi-stage processes and perchlorinated starting compounds, the new process impresses with a single-step reaction which allows it to produce perhydropolysilane at significantly lower costs. Furthermore, based on the obtained perhydropolysilanes formulations for spin coating and inkjet printing were developed. The wet films and structures obtained by these coating processes could be converted into amorphous silicon by a high temperature conversion. Furthermore, it could be shown that by addition of suitable doping sources to the formulations (phosphor & boron) correspondingly doped amorphous silicon with good conductivity can be obtained. Furthermore, it could be shown that line structures of amorphous silicon manufactured from such perhydropolysilane formulations have sufficient layer thicknesses & profile shapes for use in integrated back contact solar cells. Since a scaling of the monosilane polymerization could not be successfully implemented in the last project year, a testing of this material in solar cell applications is still pending. The studies carried out with the available, smaller amounts of material show that nothing should stand in the way of such an application after successful scaling.

Project consortium

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Participating countries and financing:

Country	Number of organisations involved	Project costs in EUR	Public funding in EUR
Germany	1	170'071	110'546
Austria	1	373'633	317'588
<i>Total</i>	<i>2</i>	<i>543'704</i>	<i>428'134</i>

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