Monoscribe

Roll-to-Roll Monolithic Interconnection of Customizable Thin-film Solar Modules

Andreas Zimmermann
Sunplugged GmbH
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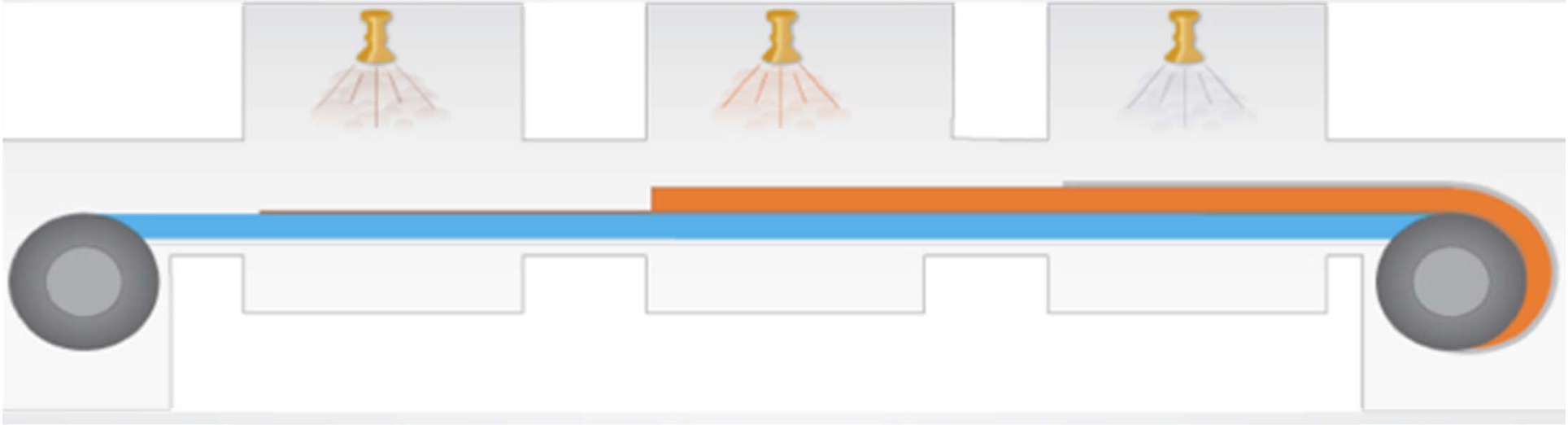
Customizable Photovoltaics

...from the reel

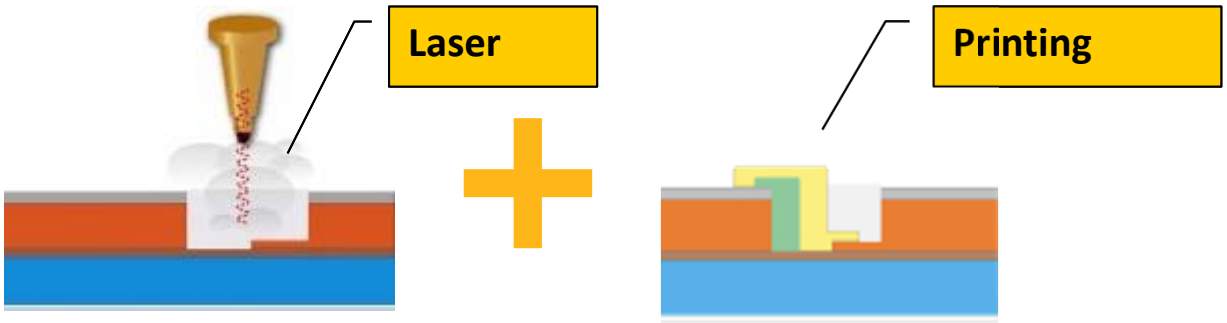
Economic Roll-to-Roll Production + **Adaptable PV-Module Layout**

A flexible inorganic solar cell is the basis

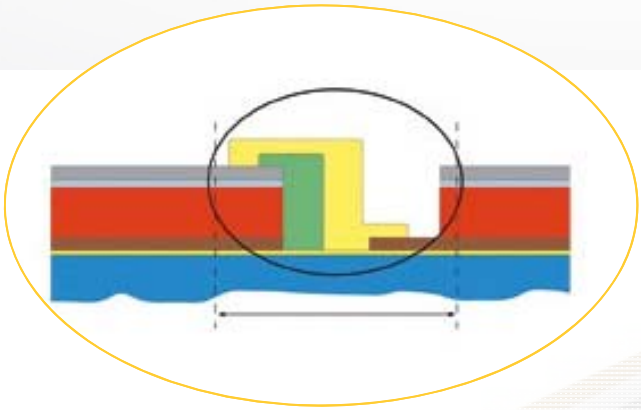
1. Step: R2R CIGS- Solar cell production



2. Step: Solar cell interconnection

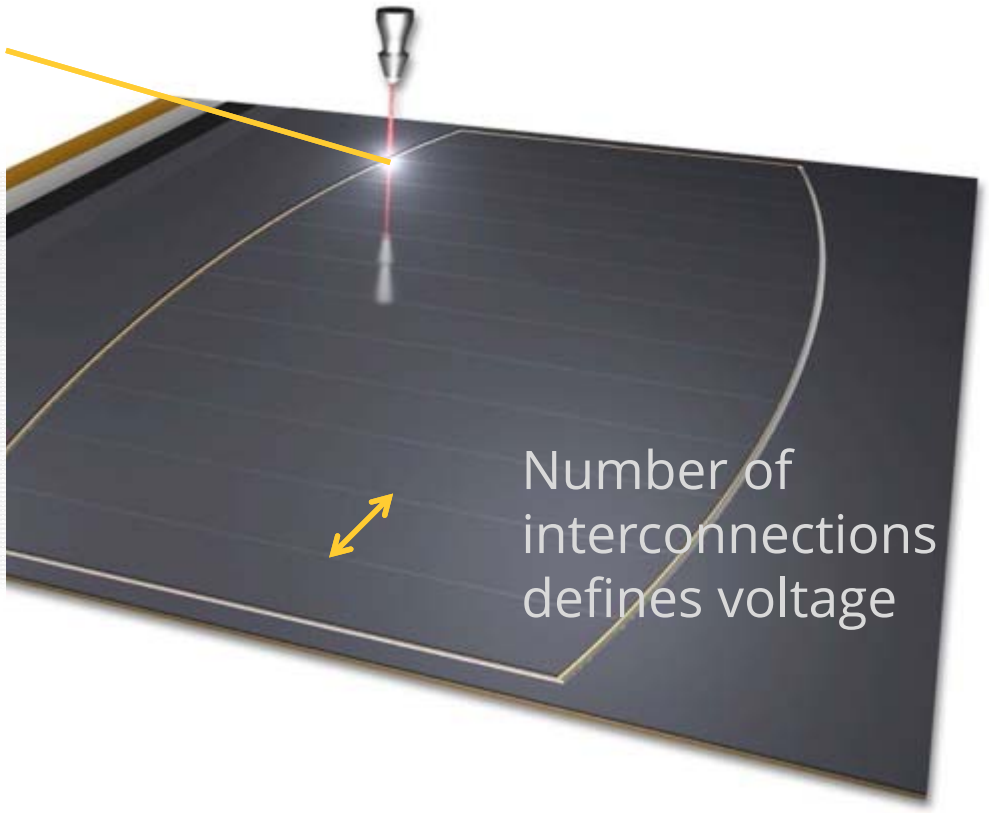


Shape, Size and Voltage „on-the-fly“



Material removal only from top side through multilayer system-> **short pulse laser**

Printing of dielectrics and conduits with **inkjet**



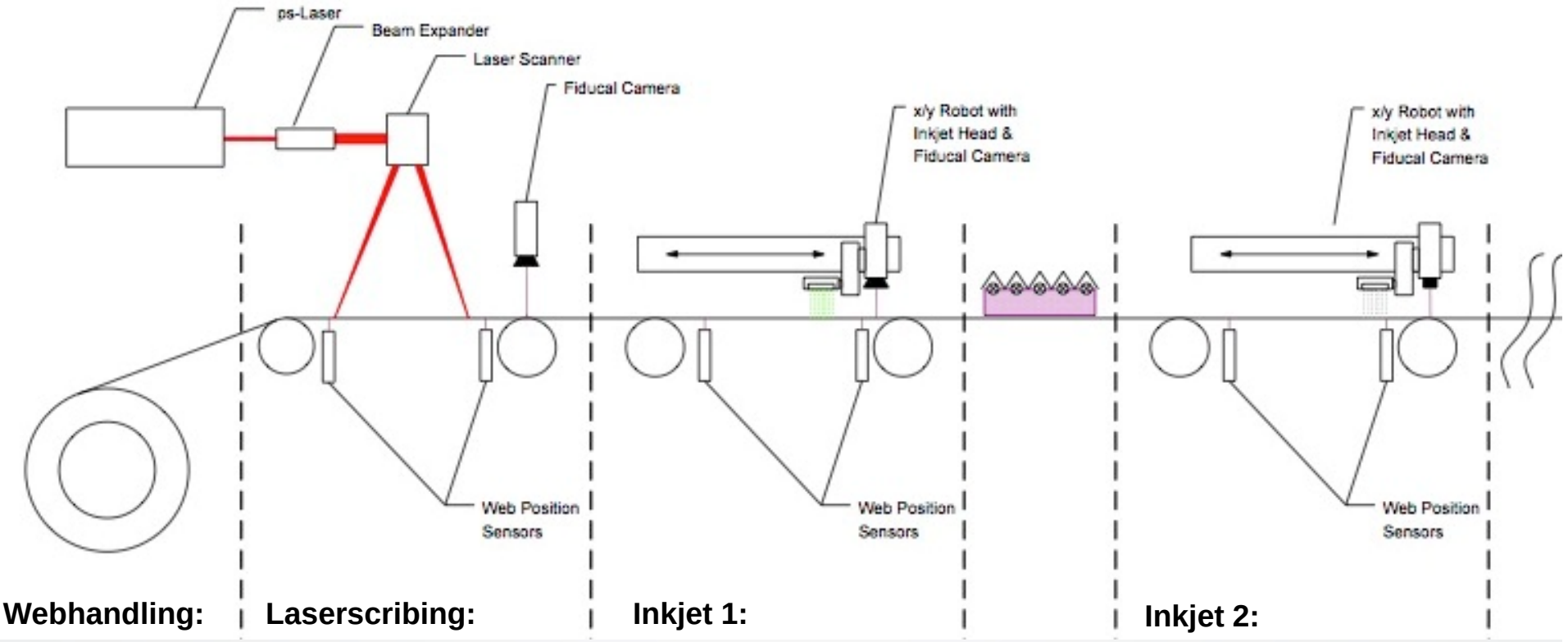
Monoscribe

Development of a **R2R machine prototype** based on Sunplugged´s Monoscribe technology

Enabling the production of **customized inorganic PV modules „on-the-fly“**.

Objective 1 Development of the machine concept
Objective 2: Development of R2R Laser Processes
Objective 3: Development of a R2R printing technology
Objective 4: Building of modular R2R Demomachine
Objective 5: Demonstration and Evaluation

Monoscribe R2R Concept

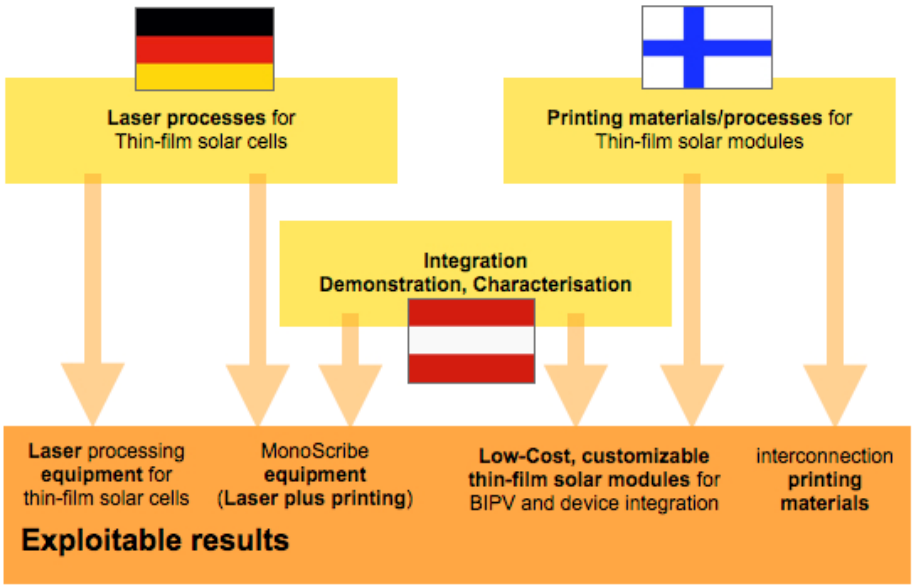


Webhandling:	**Laserscribing:**	**Inkjet 1:**	**Inkjet 2:**
Winding Web Guidance Positioning	A laser beam is used to isolate cells and remove CIGS material for the following interconnection.	An isolating layer is applied onto the isolation grooves via inkjet printing. This layer isolates the flanges of the cell. **Curing 1**	A conducting layer is applied onto the module. It connects the front contact of a cell with the back contact of the next cell, creating a serial interconnection. **Curing 2**

Partners and transnational cooperation

Munich University of Applied Sciences
(Laser Process)

LS Laser Systems
(Laser Equipment)



VTT
(printing processes)

Inkron
(Printing materials)

Sunplugged (Integration)
Alphagate (Automation)
University Innsbruck
(Material Characterisation)
Sunnybag (Demonstration)

Expected results

R2R- Production of flexible modules with desired shapes and voltages

Reduced prototyping times & time to market

Cost efficient even at small scale production (<100pcs)

Just in time production

Status,Challenges

Project started end of 2015

Project Duration: **30 months**

Currently Focus on **Process development** and **machine design**

Experiences so far:

Delay of project start due differing national requirements

Without Solar-ERA.NET project not possible

Ideas/need for new RTD projects

„Upscaling“ of areas of application-> from small consumer applications to BIPV

Efficiency Improvement of underlying flexible thin-film solar cells (CIGS) on industrial scale

Inline monitoring/metrology

Low-Cost packaging for flexible Photovoltaics