



# THIN FILM

Equipment and Process Technology  
for Thin Film Photovoltaics

— **Solar technology**

— Semiconductor technology

— Microsystems technology

— Medical technology

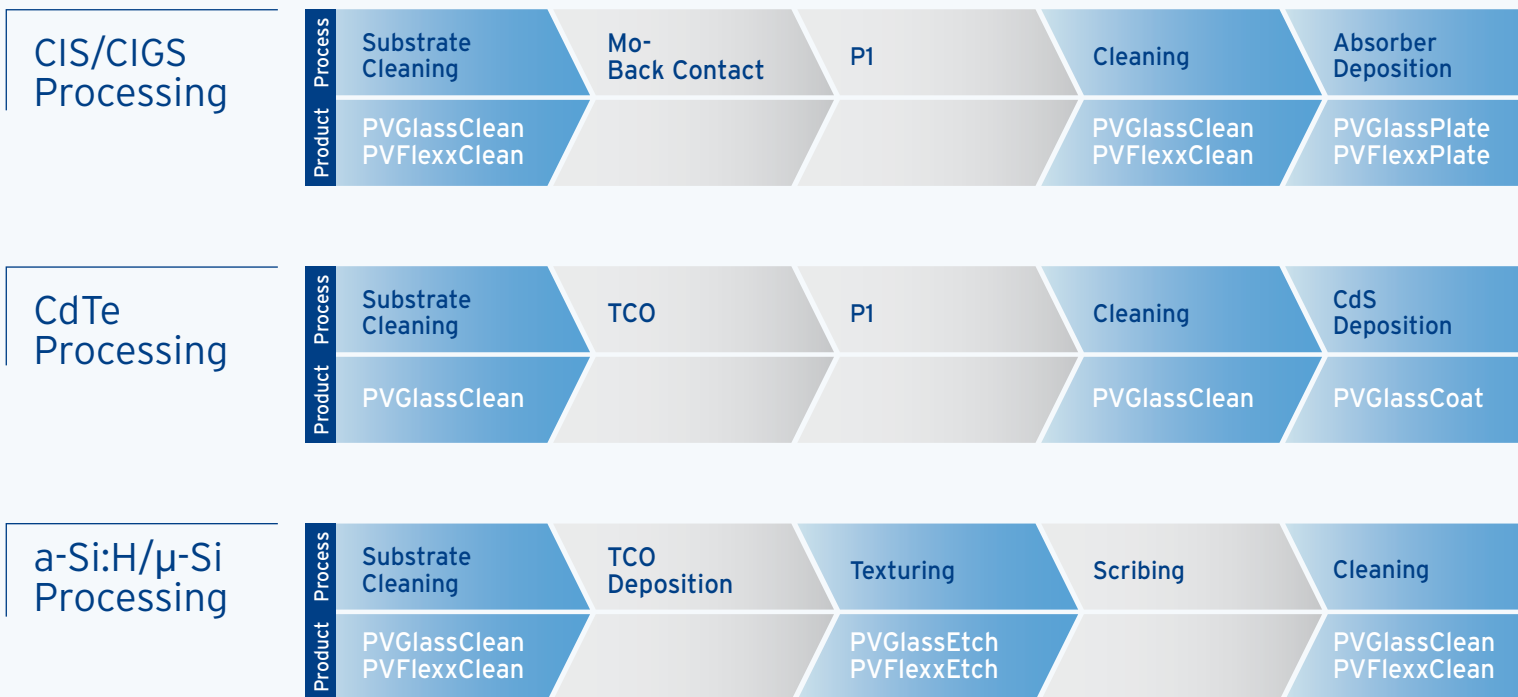
— Circuit board technology



# SOLUTIONS FOR WET CHEMICAL THIN FILM PV TECHNOLOGIES

- MAXIMUM QUALITY
- BEST TOTAL COST OF OWNERSHIP
- HIGH UPTIME
- HIGH YIELD
- PROCESS GUARANTEE

## THIN FILM SOLAR CELL PROCESSING



# THE WET PROCESSING COMPANY

RENA offers production equipment and process technology for cost-effective automated mass production of thin-film solar cells. The delivery program covers all wet-chemical process steps. RENA stands for a new generation of process equipment as a result of its intensive research and development into the production of thin-film cells with greater raw material and performance efficiency.



# SUBSTRATE CLEANING

OPTIMISED PRODUCTION  
PROCESSES ON GLASS AND  
FLEXIBLE SUBSTRATES

HIGH THROUGHPUT

SMALL FOOTPRINT

PROCESS SOLUTIONS

MODULAR DESIGN

Product Process

Incoming Cleaning

PVGlassClean | PVFlexxClean

HQ-Cleaning

PVGlassClean / PVFlexxClean

Cover Glass Cleaning

PVGlassClean

High-performance cleaning equipment with the RENA own process technology ensures best cleaning results.

## Features and Benefits

- Standard and customer-specific substrate sizes up to 3300 mm
- Inline system
- Transport system with lateral guides
- Low noise level < 75 dB
- Anti-UV-light equipment design
- Substrate breakage rate < 0.01%
- "No tool philosophy" for transport maintenance
- Automatic dosing system for chemicals
- Water recycling system
- Automatic height adjustment for different substrate thicknesses
- Low cost of ownership



# STANDARD PROCESS SOLUTIONS

MODULAR DESIGN FOR ALL PROCESS REQUIREMENTS

COST REDUCTION BY STANDARDISATION

HIGH RELIABILITY

PROVEN TECHNOLOGY

UPTIME > 98 %

## Modular Design

- Spray zone
- High pressure cleaning
- Roller brush
- Disc brush
- Ultrasonic
- Hydro dynamic flooding (HDF)
- Alkaline or acidic cleaning
- Bubble jet clean

## Application examples

- Incoming cleaning
- High-quality cleaning
- Cover glass cleaning

# ETCHING

ETCHING PROCESSES ON GLASS  
AND FLEXIBLE SUBSTRATES  
FOR TEXTURING TCO AND ABSORBER  
ETCHING

HIGH THROUGHPUT

UPTIME > 98 %

BREAKAGE RATE < 0.01%

HOMOGENEOUS ETCHING

Product Process

Texturing

PVGlassEtch | PVFlexxEtch

Absorber Etching

PVGlassEtch | PVFlexxEtch

State-of-the-art equipment and process technology offers high etching rates and homogeneous results.

## Features and Benefits

- High uniform etching process technology
- Standard and customer-specific substrate sizes up to 3300 mm in width
- Inline system / Roll-to-roll technology
- Integrated automatic process control systems
- Process support by experienced process engineers from RENA
- Transport system with lateral guides
- Customised module integration solutions
- Customised safety solutions

## Application examples

- HCl etching after TCO deposition
- "NP" etching ( $\text{HNO}_3$  /  $\text{H}_3\text{PO}_4$ )
- KCN etching



# PLATING

INNOVATIVE DEPOSITION PROCESSES  
FOR HOMOGENEOUS PLATINGS ON  
GLASS AND FLEXIBLE SUBSTRATES

HIGH CHEMICAL EFFICIENCY

UPTIME > 98 %

EXCELLENT COST OF OWNERSHIP

NON-VACCUUM TECHNOLOGY

Product Process

Plating

PVGlassPlate

Plating

PVFlexxPlate

Inline electroplating process solutions.

## Features and Benefits

- Inline plating system
- Modular design
- Patented plating cell technology
- High uniformity
- Low cost of ownership
- High chemical efficiency
- Total safety solution
- Touchless transportation
- Web tension control

## Application examples

- Metal stack electro-deposition  
(i.e. Ga-Cu-In)



# COATING CBD

UNIQUE CHEMICAL BATH  
DEPOSITION FOR HIGH EFFICIENT  
BUFFER LAYERS AND ABSORBERS

LOWEST COST OF OWNERSHIP

SMALL FOOTPRINT

INLINE PROCESS CONTROL

COATING ON FLEXIBLES

Product Process

CdS-Coating

PVGlassCoat

CdS-Coating

PVFlexxCoat

Proven future-oriented process for inline coating of glass and flexible substrates.

## Features and Benefits

- Low cost of ownership
- Fully automatic inline system
- Throughput increase by high speed processes
- No backside contamination
- Water treatment of DI-rinsing water
- Total waste water treatment solution
- Automated dosage system
- Patent pending

## Application examples

- Chemical bath deposition (CBD) for buffer layer (i.e. CdS, ZnS)
- n-type CdS for CdTe



# COATING CBD

INLINE CHEMICAL BATH DEPOSITION  
FOR 24/7 PRODUCTION ON GLASS  
OR FLEXIBLE SUBSTRATES

HIGH CHEMICAL YIELD

TOTAL SAFETY SOLUTION

UPTIME >98%

COATING ON GLASS

## Features and Benefits

- Inline single side deposition
- Modular design
- Temperature control
- High homogeneity
- No pin-holes
- Total safety solutions
- Double housed system

# COATING ACTIVATION

ABSORBER ACTIVATION BY  
ADJUSTABLE ROLLER COATING  
FOR GLASS SUBSTRATES

COATING ON GLASS SUBSTRATES

TOTAL SAFETY SOLUTION

UPTIME >98 %

BREAKAGE RATE <0.01%

Product Process

CdCl<sub>2</sub>-Coating

PVGlassCoat

Total CdCl<sub>2</sub> solution - coater -  
mixing cabinet - safety line

## Features and Benefits

- Inline single side deposition
- Modular design
- High throughput
- Temperature control
- Adjustable roller pressure
- Measurement of the amount of deposited liquide
- Total safety solution
- Double housed system
- Waste water treatment solution of concentrated CdCl<sub>2</sub>
- Chemical cabinet

## Application examples

- CdCl<sub>2</sub>-activating of CdTe





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