



SELENIUS

Inline Evaporation System
for CIGS Thin-Film Solar

SELENIUS

Processing Systems for Evaporation of CIGS Thin-Film Solar Cells

SELENIUS Evaporation System for Thin-Film Solar

The inline co-evaporation tool is based on the thermal evaporation of all CIGS-related precursor materials. It is dedicated to the deposition of copper-indium-gallium-selenium layers for the purpose to form optimum precursor layers in the application of CIGS-thin-film solar cells.

The evaporation system consists of a handling station, multiple heating/cooling stations and deposition-chambers.

The inline evaporation system is offering proven thermal deposition technology, that delivers a high material utilization and excellent layer uniformity. In combination with a high uptime and mechanical yield, the system leads to a highly optimized and flexible production platform.



SELENIUS

Technical Data

Material	Copper, Indium, Gallium and Selenium deposition on glass substrates
Substrate Dimensions	max. 1200 x 1600 mm ² (other substrate sizes on request)
Substrate Thickness	2-3 mm
Footprint	depending on requested throughput
Cycle Time	depending on process requirements and requested throughput
Uptime (SEMI E10)	85 %
Main Voltage	400 V 3 AC/PE 50/60 Hz
Other Required Utilities	Cooling water, compressed air, process gases

Main Features

- Inline evaporation tool with high throughput capability
- Modular chamber design supports a flexible layout conception to meet the production requests of the customer
- Optimized evaporation source utilization through unique chamber design (minimized wall deposition)
- High deposition speed and repeatability
- Excellent flux uniformity
- Easy and fast source refilling/replacement due to user-friendly source positioning
- Optimized maintenance concept for maximum machine availability/uptime
- High deposition speed
- Excellent temperature uniformity during process sequence
- Substrate pre-heating
- In-situ monitoring of flux and temperature
- Proven safety concept based on solid risk management and safety engineering

Key Components

The evaporation system consists of the following key components:

- Handling section
Transport of the substrates between the fab-automation and the evaporation system, including load-/unload of the process carriers
- Process section
Entrance load lock and pre-heating chamber provide the necessary vacuum level and apply an initial temperature profile for the consecutive process steps
- Deposition Chambers
Integrated multiple chamber system with heating – deposition – cooling capability. Chambers designed for excellent temperature uniformity and excellent deposition of different materials by optimized deposition-speed and geometry to achieve high repeatable precursor layers
- Cooling Chamber and Exit Chamber
Substrate cooling and exit on pre-defined temperature
- Periphery
Handling system
Vacuum system
Cold Traps (in front of TMPs)
Metrology





Headquarters

SINGULUS TECHNOLOGIES AG
Hanauer Landstrasse 103
D - 63796 Kahl, Germany
Tel. +49 6188 440-0
Fax +49 6188 440-130
sales@singulus.de
www.singulus.de

Production Site for Wet Processing Systems

SINGULUS TECHNOLOGIES AG
Branch Office Fuerstenfeldbruck
Fraunhoferstr. 9
82256 Fuerstenfeldbruck, Germany
Tel. +49 8141 3600-0
Fax +49 8141 3600-100
sales@singulus.de

Subsidiaries

China
**SINGULUS TECHNOLOGIES
(SHANGHAI) Co. Ltd.**
Room B412-413, No. 1400 Jiangchang
Road, Jingan District, Shanghai, China
Zip Code: 200072
Tel. +86 13916990710

Contact: Greens Pan
Tel. +86 13822138376
greens.pan@singulus.com.cn

Contact: Michael Han
Tel. +86 13917382315
michael.han@singulus.de

France
**SINGULUS TECHNOLOGIES
FRANCE S.A.R.L.**
Tel. +33 3 893111-29
singulus@club-internet.fr

Latin America
**SINGULUS TECHNOLOGIES
LATIN AMERICA LTDA.**
Tel. +55 1121 6524-10
sales@singulus.com.br

Singapore
**SINGULUS TECHNOLOGIES
ASIA PACIFIC PTE LTD.**
Tel. +65 674 119-12
sales@singulus.com.sg

Taiwan
**SINGULUS TECHNOLOGIES
TAIWAN LTD.**
Tel. +886 2 2748-3366
sales@singulus.com.tw

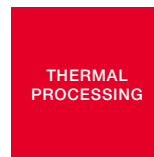
United States and Canada
SINGULUS TECHNOLOGIES INC.
Tel. +1 860 68380-00
sales@singulus.com



THIN FILM
DEPOSITION



SURFACE
ENGINEERING



THERMAL
PROCESSING



WET
CHEMICAL

SINGULUS TECHNOLOGIES – Innovations for New Technologies

SINGULUS TECHNOLOGIES builds innovative machines and systems for efficient and resource-friendly production processes. SINGULUS TECHNOLOGIES' strategy is to take advantage of its existing core competencies and to expand these further.

The core competencies include vacuum coating, surface processing, wet-chemical and thermal production processes. The company offers machines, which are used worldwide in the solar, semiconductor, medical technology, consumer goods and optical disc sectors. For all of the machines, processes and applications SINGULUS TECHNOLOGIES harnesses its automation and process technology expertise.