

Analysis of Process Baths in Solar Cell Production



ProcessLab – Monitoring wet-chemical Processes
in Solar Cell Production

Monitor texturing processes reliably and efficiently with ProcessLab

The production of solar cells is a highly sensitive continuous process. Strict monitoring and process management are indispensable for optimizing capacity, quality and costs. This goes hand in hand with the demand for traceability and compliant process documentation. Thanks to proven and robust laboratory technology, ProcessLab perfectly masters this challenge. ProcessLab makes automatic monitoring of the relevant parameters a matter of course.

ProcessLab – concept and function

Each ProcessLab system is customized. It is designed and individually produced for the specific requirements of the process. This flexible concept enables almost seamless integration of the system, also into existing processes.

The point in time and scope of a measurement are determined by the user. As ProcessLab does not have to be calibrated, it is available at all times (including in shift operation) for efficient and accurate analysis of a wide range of samples from texturing, treatment and rinsing processes. The analytical results are stored in the integrated database and are displayed graphically in the control chart immediately after the analysis. The data is also available via Ethernet or as a 4...20-mA analog signal.

Application fields for ProcessLab

Texturing processes

Texturing removes contaminants from the wafer surface and enhances the light-absorbing properties of a solar cell. ProcessLab determines the concentrations of the relevant components (e.g. HF and HNO₃) by titration, thus enabling precise and efficient control of this core process. Direct conclusions can also be drawn regarding the condition of the baths used

Rinsing and preparation steps

Rinsing and preparation baths ensure a defined surface structure. Regular analytical control allows early detection of spent cleaning media. Carryover from previous process steps can also be detected in good time and preventive measures taken. While pH and conductivity measurement are insufficient for identifying or quantifying contamination, this is usually possible with ProcessLab.

Additional parameters

The flexible concept allows additional measurement parameters to be determined. Furthermore, numerous interfaces allow straightforward integration of external devices, whose measurement data are also available for further processing and storage (internally and externally).



Cost reduction with optimal yield

Even small deviations in the process variables can affect the efficiency of the overall process. As a result of its high accuracy, ProcessLab facilitates preventive process management, which translates into higher yields and reduced

consumption of chemicals. Reject costs are reduced and the useful life of the process baths is increased. This saves resources while boosting competitiveness.

Your advantages at a glance

- Customized analyzer for comprehensive process control
- Longer useful bath lives thanks to optimal use of the process window
- Calibration-free, absolute determinations
- Monitoring of several production lines
- Traceability and compliant documentation thanks to integrated data management
- Integration and control of external devices including data transfer
- Export and import of data via Ethernet or 4...20-mA interfaces

Fields of application

Alkaline and acid texturing	HF/HNO ₃ /H ₂ SiF ₆ H ₂ SO ₄ Acetic acid Alkalinity Acidity
Washing and cleaning	pH and conductivity Rinse additives Complexing agents (NTA, EDTA,...)
Rinsing	pH and conductivity Alkalinity Acidity
Hydrophilization	H ₂ O ₂ Alkalinity Acidity
Direct measurements	pH and conductivity Parameters from external devices

Ordering Information

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ProcessLab features a modular design and always consists of a complete Base Unit and optional expansion modules. The Base Unit contains all the system components required for correct function, but has to be supplemented with the wet-part modules, mounted on the front panel, and I/O components.

2.875.0510	875 ProcessLab Base Unit, touch screen, left-hinged door
2.875.0520	875 ProcessLab Base Unit, touch screen, right-hinged door
6.7201.200	ProcessLab MDM Controller with 1 measuring input
6.7201.210	ProcessLab MDM Controller with 2 measuring inputs
6.7201.300	ProcessLab MDM Controller pH
6.7201.400	ProcessLab MDM Controller conductivity

Options

A comprehensive program of additional components is available. Here is just a small selection:

- ProcessLab digital input and output 24 V DC
- ProcessLab analog input and output 4...20 mA
- ProcessLab relay output
- ProcessLab solenoid valve module
- Containers with liquid-level sensor in different sizes

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Please contact your local Metrohm distributor for further information on ProcessLab. Thanks to the flexible and modular concept, ProcessLab can be optimally adapted to specific requirements.

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