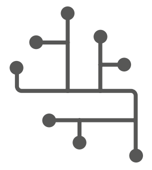
Systems technology



Leading production equipment for PCB, package substrate and semiconductor

Electronics

Systems technology

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Systems technology at a glance

High-end production solutions

- Printed circuit boards (MLB, flex / rigid-flex, HDI boards)
- Package substrate
- Advanced packaging and semiconductor
- Flat panel displays

Systems solutions
- Uniplate® PLBCu6 for mSAP desmear, PTH, flash plating
- Uniplate® IP3 pattern for horizontal pattern plating
- Uniplate® PLB UTS-xs+ for amSAP down to 25µm + 2x2µmCu
- MultiPlate® for panel and wafer level packaging
- vPlate® for touchless pattern plating

Production sites
Germany: PCB, package substrate, semiconductor and flat panel display equipment
China: PCB and IC substrate equipment

R&D
ISO certified development processes and pilot lines capability in TechCenters

Sustainable equipment
Systems solutions and auxillary equipment to help customers save water, chemistry and energy

One stop shop
Chemistry, equipment, process know-how and service from one source

424 registered patents worldwide

Recognized in the industry for quality and precision
> 1,600 Uniplate® P, LB and Cu modules delivered so far
> 110 Horizon® Stannatech
> 100 Horizon® Bondfilm installations

MKS' Atotech unique systems approach

\>930

electrolytic copper plating modules installed worldwide

MKS' Atotech equipment capabilities date back to 1957

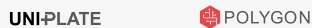
MKS' Atotech is the only plating chemicals company that provides customers the added advantage of high-quality equipment, chemistry, support and services. Paired with our broad production know-how, our highly proficient personnel and manufacturing capabilities make us the trusted partner within the industry. We provide customers with expert consultations and complete factory design concepts to help expedite new product launches.

Our production systems guarantee the highest level of quality and efficiency in wastewater treatment solutions, all at a reduced cost. We are constantly improving manufacturing processes, applying the latest HSE standards to ensure the utmost safety for us and our customers.

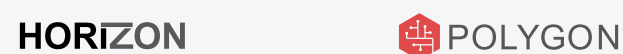
Key highlights

- References with all leading HDI, IC substrates and MLB producers
- Highest reliability / plating performance and at the forefront of fine line process capability
- Leading solutions for reduced water, energy and process chemistry consumption
- Continuous research for new technology
- OEM relevant development
- High level of automation and process control for reliable results and high production yield

Our broad solutions portfolio



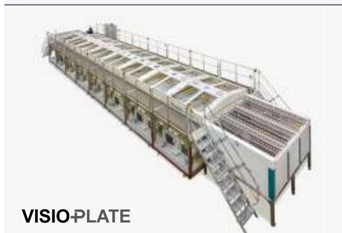
Desmear, metallization, electrolytic copper plating



Inner layer bonding, laser drilling, pre-and posttreatment

MULTI-PLATE

FO wafer and panel level packaging



Flat panel display

Vertical conveyorized copper plating

Auxiliary equipment

Redumat and Oxamat

Reduction of particles resulting in longer bath lifetime and better process stability

Technology application	Process	Atotech solution
MLB, HDI, package substrate, flex / rigid-flex	Desmear	Uniplate® P, Polygon P-Line®
	PTH:	
	Electroless copper	Uniplate® LB, Polygon LB-Line®
	Direct plating	Uniplate® CP, Uniplate® NP
	Electrolytic copper plating:	
	Conformal, BMV filling (panel)	Uniplate® Cu IP2
	THF filling (panel)	Uniplate® Cu IP2 Advanced
	Pattern filling	Uniplate® Cu IP3 Pattern
MLB, HDI, package substrate, flex / rigid-flex	Immersion tin	Horizon® Stannatech
	Innerlayer bonding	Horizon® Bondfilm
	LDD pre- and postreatment	Horizon® Bondfilm LDD (SR)
	Advanced surface treatment	Horizon® CupraEtch, Polygon ST-Line®
Fan-out wafer level packaging, panel level packaging and double side plating (e.g. power IC)	Tall copper pillar plating	MultiPlate® W, MultiPlate® P
	RDL plating	
	Through-hole filling	
	Double side plating	
Flat panel display	Electroless copper	VisioPlate®
mSAP, rigid-flex, IC substrates, advanced HDI, MLB	Electrolytic Cu plating	vPlate®
	Pattern plating	
	BMV filling	
	TH filling	

Auxiliary equipment

Crystallizer® and ConStannic®

Designed to minimize chemistry costs whilst maximizing process control

Our German facility – driving innovation and excellence

2,000

m² cleanroom equipment manufacturing site

MKS' Atotech equipment facility in Feucht near Nuremberg embodies the highest standards of German precision, quality and performance.

The facility has been operational for over 60 years and consistently expanded ever since. It plays a key role in the growing success of our horizontal plating equipment for the PCB industry starting from the late 1980s. Today, this plant is a key supplier to OEMs and other manufacturers in the semiconductor, panel and wafer-level packaging, printed circuit board and flat panel display industry all across the globe.

Cleanroom production facility – part of our 17,000m² equipment production facility is a 2,000m² ISO8 cleanroom which offers:

- Controlled temperature and humidity with 70% heat recovery
- Regular particle measuring and tracking
- Efficient particle control with constant air exchange
- Line testing with high purity DI water
- Ultrasonic cleaning device for small incoming parts
- Spray cleaning machinery for large incoming parts
- Entrance locks

China facility – world-class production with best local service

63,000

m² land, of which 20,100 m² are production area

MKS' Atotech equipment manufacturing facility in Guangzhou, China is designed to meet the growing demand for our plating equipment.

MKS' Atotech's China plant underlines our long-term commitment to the region. Staying closer to our customers allows us to serve them with greater accuracy and efficiency. At this plant we manufacture our core products, the Uniplate® and the Horizon® as well as the newly launched ST-Line®, a new cost effective equipment for advanced surface preparation.

Globally, this is MKS' Atotech second facility dedicated to manufacturing production equipment for the electronics industry. Built on an area of 63,000 m², the facility meets latest technology and quality standards, as well as rigorous sustainability norms.

Our ground-breaking machines and processes are customers' equipment of choice when they want to ensure greater precision, accuracy, highest performance and efficiency and in the production of next generation PCBs and IC substrates. MKS' Atotech is an unrivaled equipment supplier with a strong focus on R&D and cost-optimized manufacturing.

End markets and industries we serve

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Smartphone

Automotive electronics

Computing

Big data infrastructure

Consumer electronics

Communication infrastructure

Atotech an MKS Brand

info@atotech.com

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Horizon® Stannatech

Immersion tin equipment

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Perfectly controlled immersion tin system

Lower process costs

Excellent performance for highest demands

The MKS' Atotech Stannatech's® 1.0 µm pure tin deposit prevents growth of the intermetallic though the tin layer. This ensures perfect performance for multiple soldering even after 12 months storage.

Our system is ideally suited for surface mounted technology (SMT) and press fit technology where planar and robust surfaces are required. We reduce whisker growth well below IPC's specification with our 'anti-whisker additive' (AWA), meeting the demands of the automotive industry. By using a special process step – Ionix SF – you can dramatically minimize surface contamination which is critical for immersion tin baths. Ionix SF belongs to the standard process sequence for Stannatech® Horizon. Use the optional step 'PostDip 270' to avoid yellowing of the tin surface that would otherwise occur due to the harsh conditions during Pb-free soldering in an air environment.

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Most used immersion tin process worldwide

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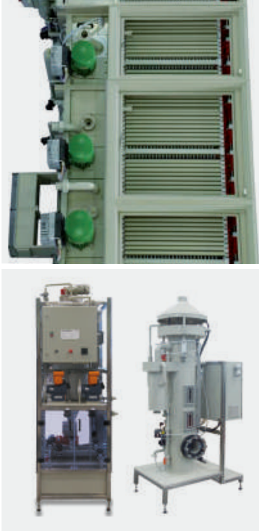

Figure 1:
Horizon® Stannatech
Figure 2:
Crystallizer® and ConStannic®

Leading-edge equipment

We re-design and review our systems continuously. That way we can constantly optimize the cost, environmental and technical performance of plating systems for you. In response to your needs, we improved the design and enhanced the material inventory while maintaining the production line and process quality standards of the world's most popular immersion-tin equipment.

Sustainable approach

The ConStannic® and Crystallizer® are patented immersion tin regeneration units that guarantee highest productivity while keeping the environmental impact at a minimum. They are composed of two individual elements. The ConStannic® reduces electrolytic Sn^{4+} to the beneficial Sn^{2+}. Simultaneously the Crystallizer® removes dissolved copper from the panels. Both parts combined eliminate the severe sludge formation that normally occurs in the process and replaces extensive feed and bleed dosing or frequent new make-ups.

Benefits	Features	Package
Lower energy consumption compared to HASL process	Low temperature process requires less heating	Standard
Performance consistency	Computer controlled line with receipe system for definded process settings	Standard
Higher yield	Throughput optimized design	Standard
Long life time of the equipment	Solid construction with all necessary reinforcements, more than 15 years experience in the Stannatech® process	Standard
• 90% less chemistry consumption • 50% less downtime • 30% reduced process costs • 25% higher productivity	Immersion tin regeneration with ConStannic® and Crystallizer® – closed loop regeneration system	Optional

Uniplate® PLBCu6

System solutions for mSAP technology

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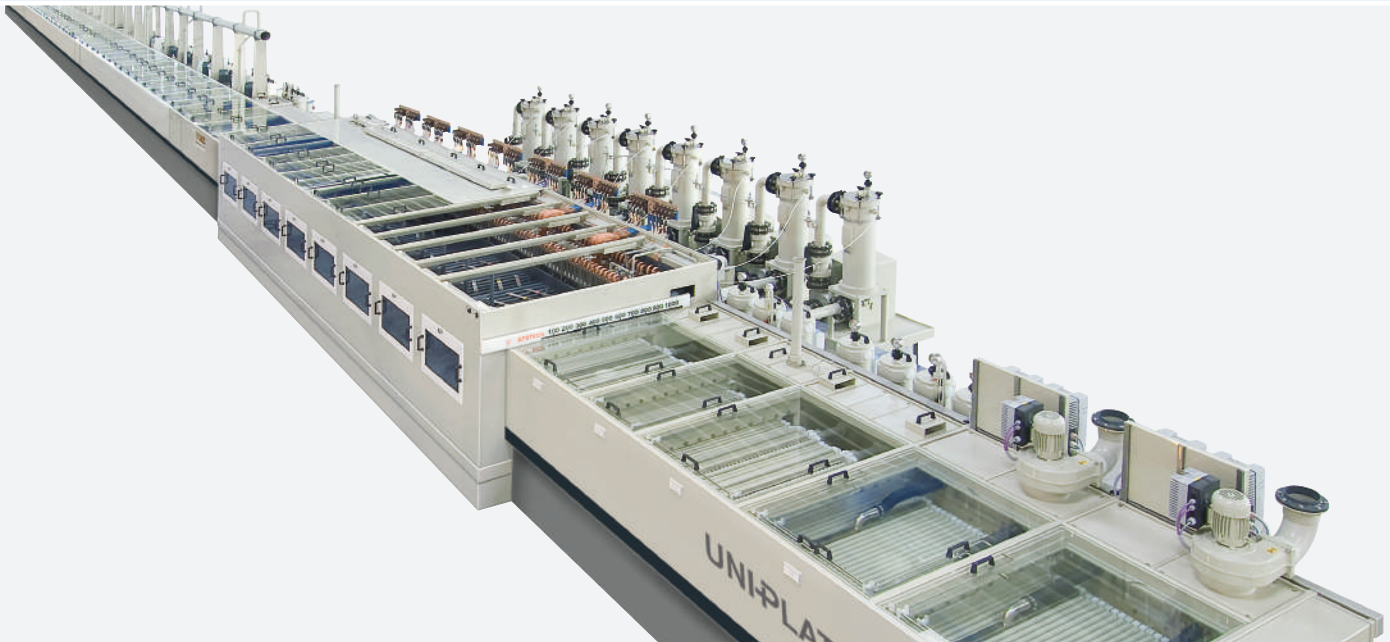
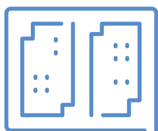


Inline process from desmear, PTH to flash plating for mSAP for high end HDI boards



Sophisticated equipment solutions for mSAP technology in HDI boards

Uniplate® PLBCu6 for mSAP

MKS' Atotech horizontal equipment is the solution of choice for modified Semi-Additive Process (mSAP) technology. This wet-to-wet solution is designed to produce outstanding reliable interconnects at a very high throughput while minimizing handling and operating needs in the process from desmear and electroless copper to flash plating.

MKS' Atotech system incorporates innovations that allow significant savings of water and energy and at the same extend the life time of chemistry. MKS' Atotech system utilizes Securiganth® E series for desmear, Printoganth® U Plus for PTH and Inpulse® 2HFU for electrolytic copper plating to achieve superior throwing power and uniformity.

For finer line and space requirements our Uniplate® platform provides several universal transport system solutions for lines and space down to 40 µm + 2x3 µm copper clad*. In addition, we are able to offer solutions for the avoidance of particles and a sophisticated filtration package for fineline structures.

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Uniplate® PLBCu6 for mSAP technology

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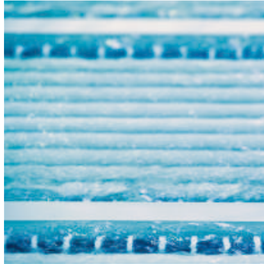
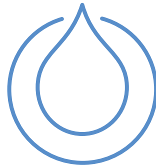



Figure 1:
Saving water

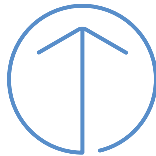
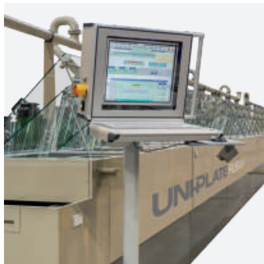


Figure 2:
Extending lifetime of chemistry



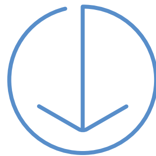


Figure 3:
Reducing handling needs

Features and benefits

- Entirely inline process with no handling needs and optimized footprint
- Significantly reduced water and energy consumption
- Seeking to optimize and extend lifetime of chemistry
- Process fully controlled via VCS
- Real time copper control in electroless copper bath for leading process stability
- Optional slim roller design in desmear and PTH for minimized touch
- Automatic cleaning cycles reducing operator capacities
- Transport system UTS-xs down to 40 µm + 2x3 µm Cu*
- Sophisticated particle reduction and filtration packages available
- High throughput
- Highly reliable metallization of through-holes and BMVs
- Excellent throwing power and uniformity
- Inert and segmented anodes avoiding oxygen and sludge formation with automatic copper replenishment

*Calculated minimum thickness for 20“ wide boards

vPlate®

The new gold standard for VCP equipment

Electronics | Equipment technology & panel and pattern plating | atotech.com

NEW SYSTEM

L/S down to 8/8 µm,
Uniformity +/- 7%
Superior pattern via filling
High current density of up to 5 ASD
DC and PPR available

Touchless transportation of PCBs and advanced pattern filling of next generation HDI and package substrates

Outperforming existing plating lines

vPlate® was developed to outperform existing plating lines available in the market today. Our new plating tool does that already by providing uniformities of ± 7% and touch-free thin panel transportation down to 36 µm + 2×2 µm Cu clad. It achieves this by utilizing insoluble anodes with adjustable anode and cathode shielding. In addition, the tool fulfills technology roadmaps for next-generation HDI and package substrates down to L/S 8/8.

Full automation of the line, incl. automatic copper replenishment, and automatic panel size adaption are standard features in vPlate®. An automatic grease supply and an automatic jig monitoring system provide options to improve operation comfort.

MKS' Atotech unique systems approach provides the best one-stop solution, supporting both equipment and process technology: vPlate® is fully compatible with our dedicated InPro® processes for advanced HDI and mSAP package substrate and provides excellent results for the highest technology requirements.

vPlate® features

Speed	0.3 – 2.0m/min
Panel standard size	Up to 558 x 635mm² (22" x 25")
Panel over-size	Up to 680 x 815mm² (26" x 32")
Panel thickness	Min.: 36µm + 2x2µm Cu clad Max.: 6.4mm
Panel handling	Clamps Jigs
Cu distribution	≤± 10% @ plating thickness >25µm <± 7% achieved in customer line
Anodes	Mono anodes Insoluble anodes

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Systems approach from MKS' Atotech: vPlate® with InPro® series

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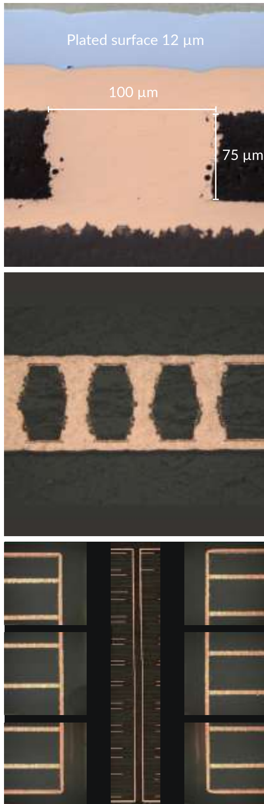


Figure 1: DC plating: BMV fill 100 × 75 µm, 1.5 A/dm², plated surface 12 µm
Figure 2: DC plating: TH fill 115 × 60 µm, 2 A/dm²

Figure 3: Pulse plating: TH conformal 6.0 x 0.2 mm opening. Throwing Power: 80%

vPlate® & InPro® MVF2

InPro® MVF2 for HDI BMV filling

- Panel plating at 2.0 A/dm² (pattern possible)
- Improved filling of BMVs in HDI/flex application at low surface copper thickness
- Outstanding throwing power in THs together with BMV filling
- Wide operating window for different applications

vPlate® & InPro® SAP3

InPro® SAP3 for pattern BMV filling

- High applicable current densities (>3 A/dm²)
- Unsurpassed copper within-unit thickness uniformity at high current densities
- Excellent and stable filling performance with dimple <5 µm
- For fine line production (< 8/8 µm L/S)
- Good pattern capability, rectangular track profile

vPlate® & InPro® THF2

InPro® THF2 for (a)mSAP production and for TH filling

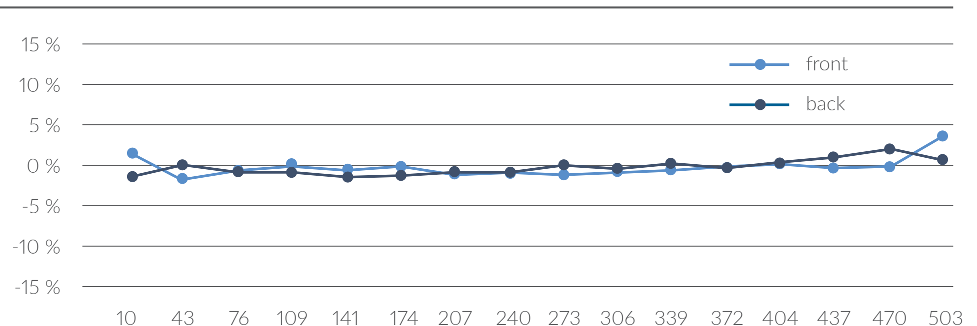
- For pattern via filling (dimple <5 µm) and through hole filling
- Applicable for high current density to enable high productivity
- Improved uniformity at wider working window
- Excellent physical properties for highest reliability

vPlate® & Cuprapulse® IN

Cuprapulse® IN for conformal plating of high aspect ratio THs

- Pulse plating for superior throwing power especially for HAR boards
- High applicable current density for increased productivity
- High throwing power & increased uniformity allows for cost saving and higher productivity
- Wide working window for better process control

X average deviation (left/right)



Horizon® BondFilm

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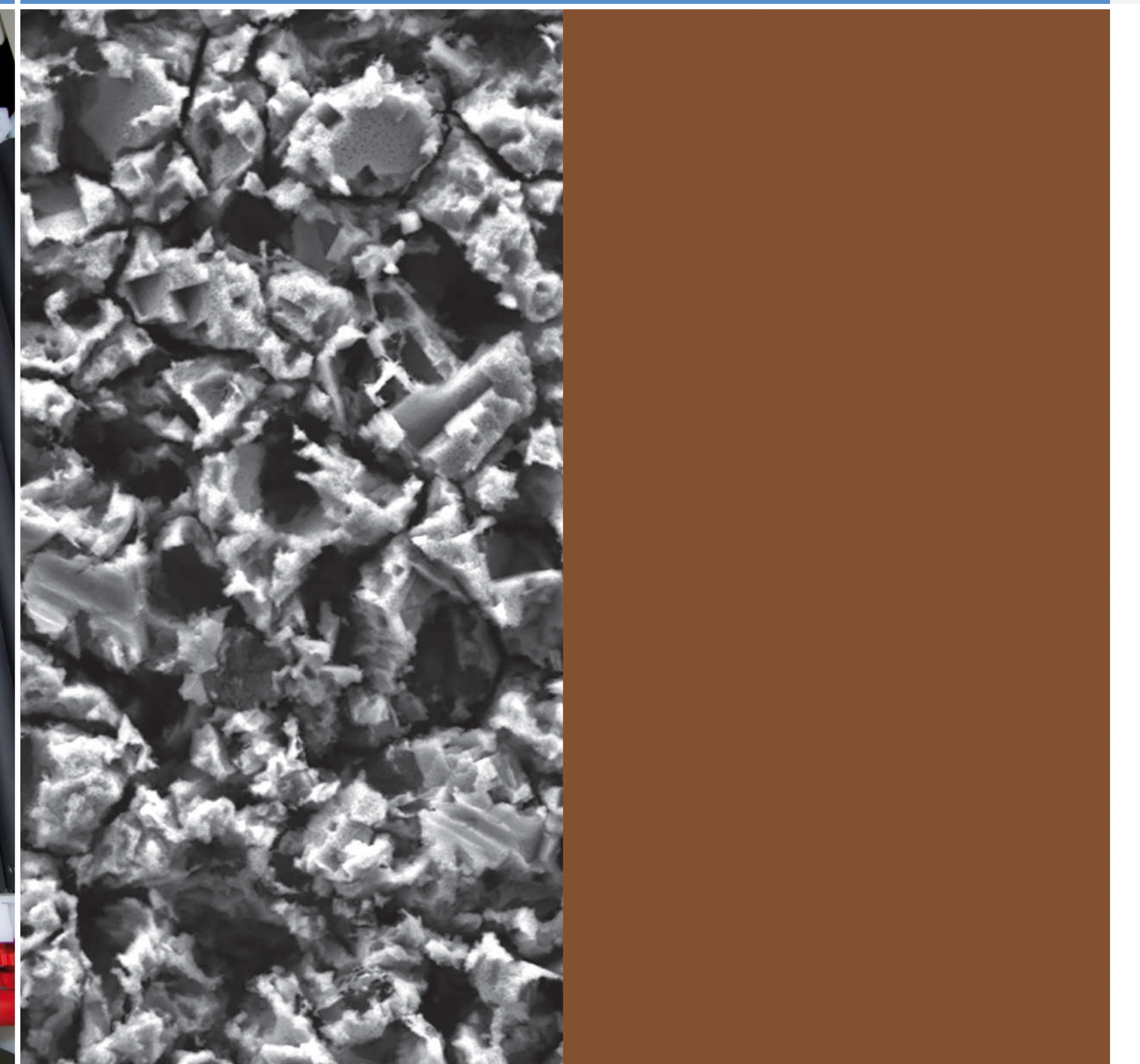
Automation, process control and thin panel transport

Superior etch rate stability and coverage

Roughened, brown organo-metallic surface after BondFilm® treatment



Horizon® BondFilm process and horizontal equipment

For I/L bonding the BondFilm® products provide reliable adhesion, excellent thermal reliability and full compatibility with a wide range of dielectric materials. Also they are characterized by a lower etch depth requirements than most conventional products.

In addition, Horizon® BondFilm is also leading for LDD (laser direct drilling) pretreatment application. The BondFilm® LDD products provide optimal pretreatment before laser direct drilling, increasing the laser energy absorption and improving the via result vs. conventional methods.

The BondFilm® Series chemistry is the No.1 oxide replacement product with mass manufacturing experience since 1999 and is in use by satisfied customers across the globe.

Features and benefits

- VCS (visual control system) for control and traceability
- Superior process stability with proprietary feed and bleed system and precise dosing system (VCS controlled)
- Safe transportation of different materials (UTS-s to UTS-xs) with precise pump control and automatic level management
- Designed for water saving and energy efficiency
- Designed to CE safety standard
- Overheating prevention by additional temperature sensor
- Fine line filtration package available