BondFilm® EX-S2

Next generation adhesion promoter

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Low roughness bonding enhancement solution for high-frequency applications

Enhanced performance

PCBs for high-frequency applications are in demand of a new bonding enhancement process that gives excellent thermal reliability and provides superior signal loss performance. BondFilm® EX-S2 is an advanced adhesion enhancement promoter that replaces conventional bonding enhancement processes, offering great adhesion performance with minimal copper removal. The minimum etch depth allows for a smooth copper interface that is desired for high-frequency applications.

Features and benefits

- Compatible with a wide range of high-performance materials for low SI loss application
- Minimal copper reduction (0.3 – 0.5 µm)
- Smooth interface < 250nm Ra
- Significant improvement of signal integrity > 8% lower SI loss than conventional processes
- High and consistent peel strength after thermal stress

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Low roughness for low SI loss

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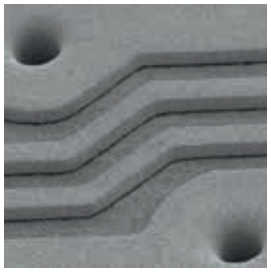


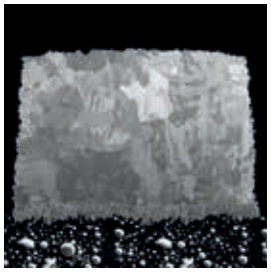
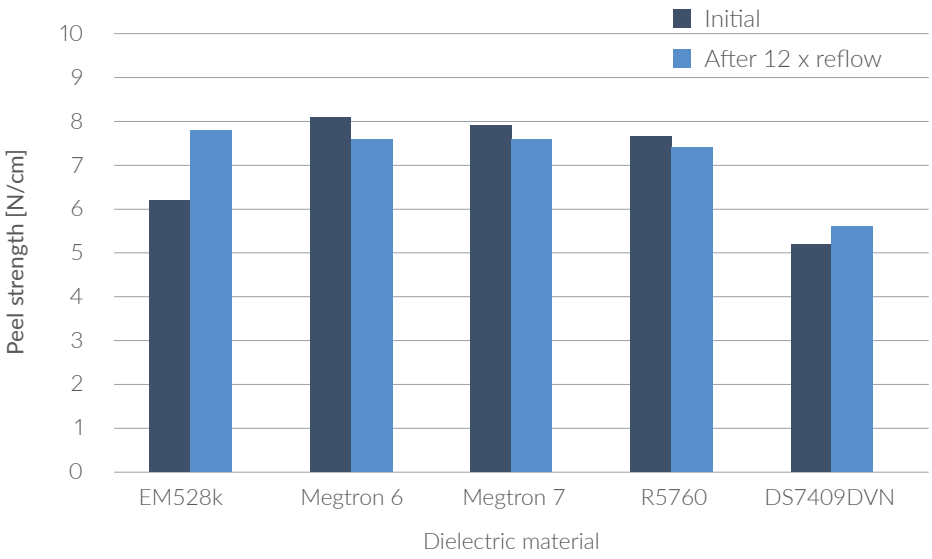
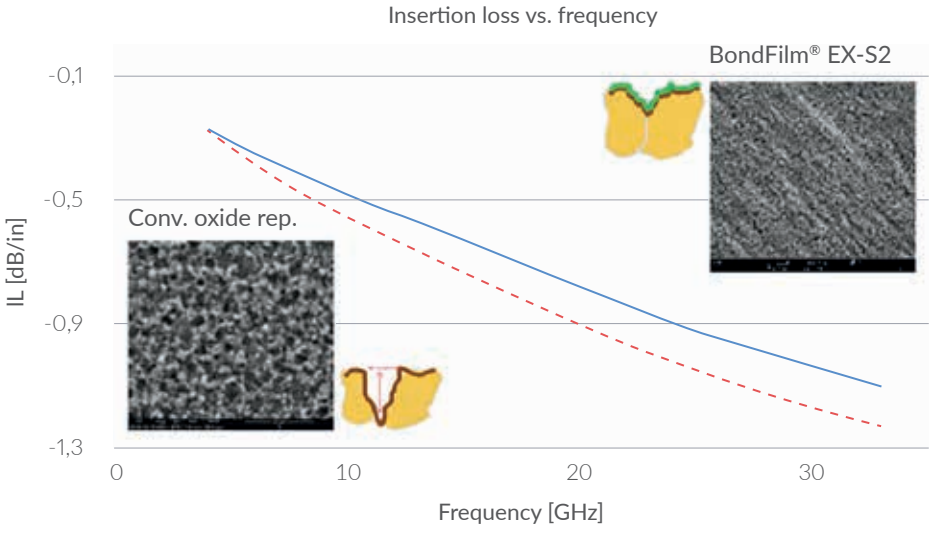


Figure 1:
Smooth conductor shape after BondFilm® EX-S2 process
Figure 2:
FIB x-section image of conductor

Excellent bonding performance with low etch depth for key low loss materials



BondFilm® EX-S2 advanced adhesion enhancement process sequence



0.3-0.5

µm etch depth

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BondFilm® HP

High performance bonding enhancement

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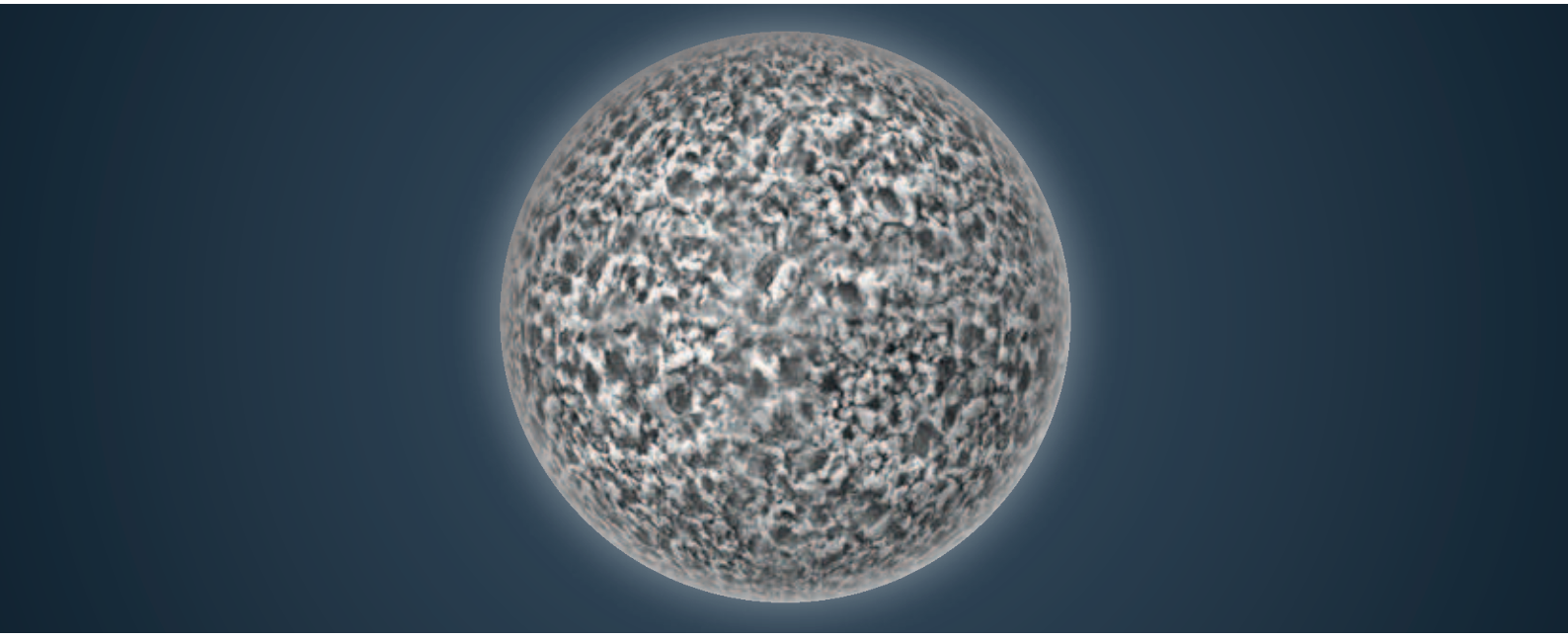

Unmachted performance for the most demanding bonding applications

Up to

98%

reduction of sludge

38 g/l

high copper loading capability

BondFilm® HP – The epitome of modern-day oxide replacements

We can confidently say that BondFilm® HP is the best oxide replacement process on the market. The benefits of this process are manifold, but its sludge and particle reduction feature particularly stand out. Since our process is ultra clean, it ensures that the need for maintenance is minimized, thus costs are reduced, but quality and yield remain at the highest level possible.

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A worthy successor of the leading oxide replacement

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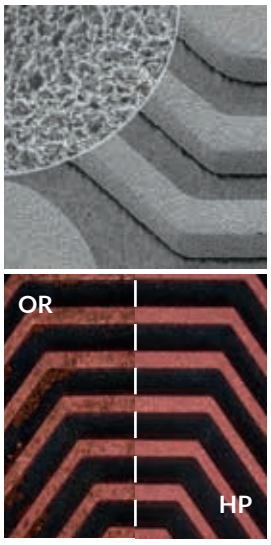

Figure 1-2:
Surface morphology and cleanliness

Performance

Ever finer lines and spaces as well as applications that require extreme high voltages demand not only the very good adhesion performance BondFilm® is known for, but also a tremendous decrease in particle formation, to prevent high resistance shorts. BondFilm® HP is not only able to serve this demand, but also allows for a decrease in etch depth and remains very stable in its performance from the first make-up until its steady state.

Environmental impact

One of our core values at Atotech is to minimize our ecological footprint. Through considerable efforts, we have succeeded in reducing the amount of wastewater in our process, saving hundreds of filters per line every year and not making any compromises in terms of performance.

Features and benefits

- Direct drop-in to conventional oxide replacements
- Low sludge formation
- High copper loading
- Low COD/m²
- Significantly reduced downtimes
- Increased process efficiency
- Lower process costs
- Savings in wastewater

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BondFilm® LDD

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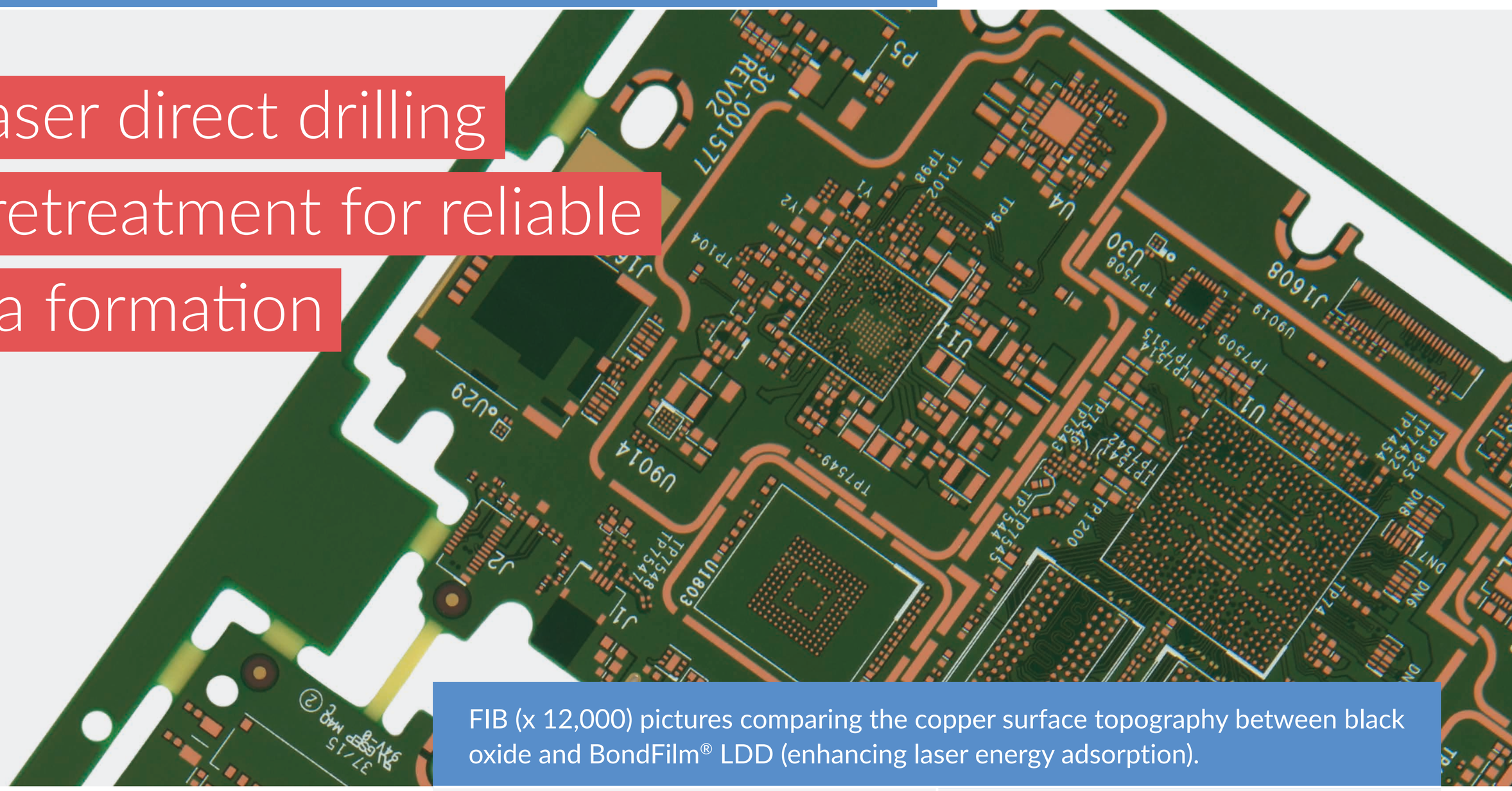
Laser direct drilling pretreatment for reliable via formation



FIB (x 12,000) pictures comparing the copper surface topography between black oxide and BondFilm® LDD (enhancing laser energy adsorption).

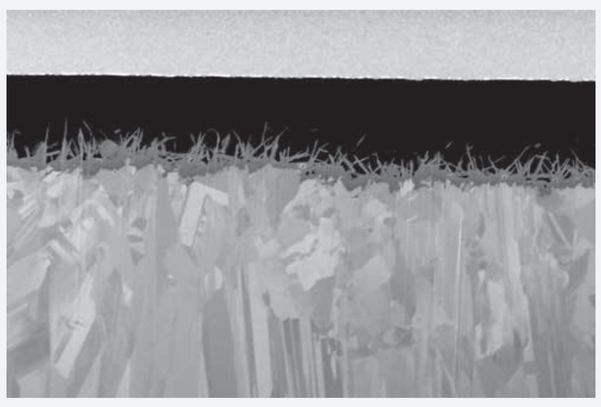
BondFilm® LDD process
CupraEtch® AE solution
35 – 45 °C / 20 – 40 s

BasicClean UC
40 – 60 °C / 20 – 40 s

BondFilm® activator
25 – 45 °C / 10 – 20 s

BondFilm® LDD
30 – 45 °C / 85 – 115 s

Laser direct drilling



Black oxide

BondFilm® LDD

Uniform etching

BondFilm® LDD is a simple low-temperature process prior to laser direct drilling. It is ideally suited to conveyorized application for thin material handling. BondFilm® LDD allows for easy process control. The increased laser energy absorption leads to more reliable and improved via formation results.

Features and benefits

- Uniform roughness and surface characteristics for improved efficiency of laser absorption
- Improved hole size / shape for excellent via filling
- Reduced risk of undercut and wedge void
- Improved absorption minimizes copper splash after LDD
- Available as a complete system with Atotech's Horizon® process equipment

CupraEtch® SR 8000

Advanced surface preparation

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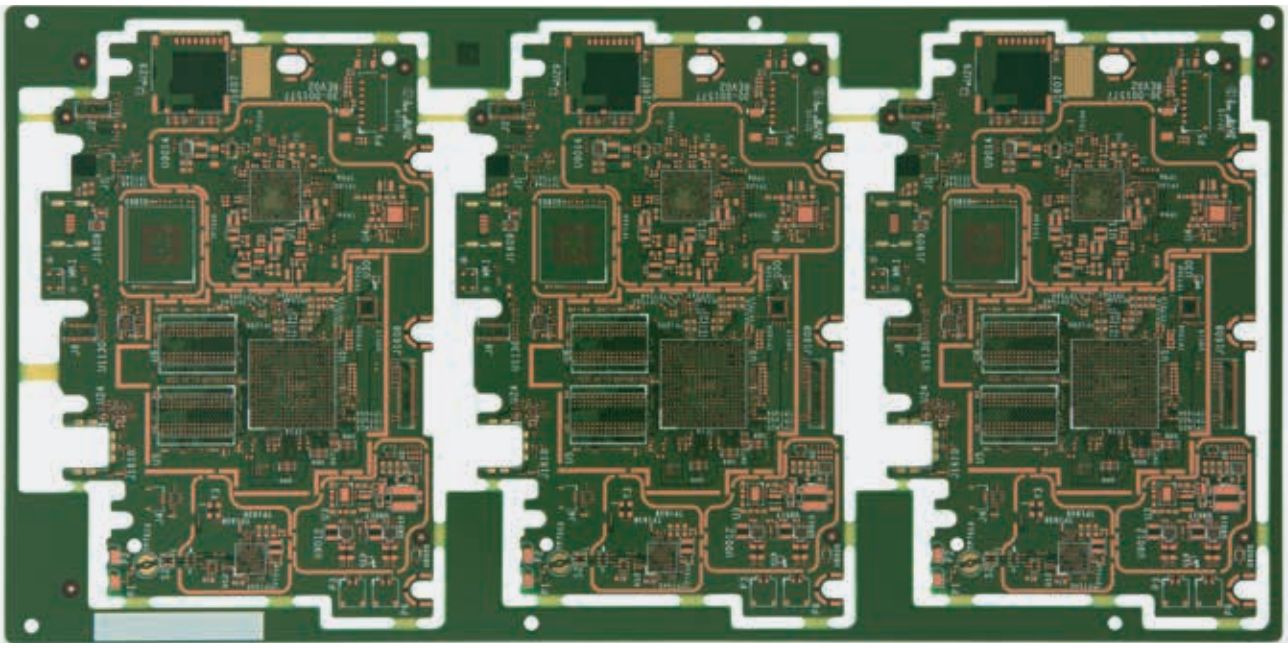

Advanced pretreatment for dryfilm and soldermask adhesion

Metal complex free solution

Excellent dryfilm and soldermask adhesion

CupraEtch® SR 8000 is a cupric chloride based microetching system with unique additives. The simple three step process creates uniform roughening of surface at low temperatures. Atotech's cost-effective pretreatment easily drops into existing lines and reliably improves the adhesion of all copper types to industry standard dryfilm and soldermask types. The metal complex free solution leads to cost-effective waste water treatment.

Features and benefits

- Fulfills demanding automotive OEM requirements
- Sucessfully passes advanced HDI requirements (< 30 µm L/S) with superior dryfilm adhesion
- Creates sufficient roughness for excellent adhesion on soldermask at low etch depths
- Excellent compatibility to wide range of selective finish processes

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High adhesion performance with minimum etch depth for cost effectiveness

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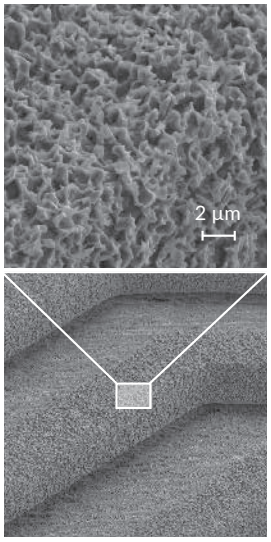

Figure 1:
Street view of fine line treated with CupraEtch® SR 8000

Easy process implementation with excellent stability

- Drop in solution to existing surface preparation line
- Simple analysis methods for easy handling and process control

	Cut board 0 m²	Cut board 500 m²	Cut board 1000 m²	Cut board 1500 m²	Cut board 2000 m²	Cut board 2500 m²
cosmetic						
SEM mag 5k						

Production benefits by using CupraEtch® SR 8000

- Consistent and reliable performance for dryfilm and soldermask adhesion
- Reduced make-up frequency due to high copper loading
- Suitable for a wide range of copper types including CCL, DC and pulse plated panels
- Simplified waste water treatment due to zero complexing agents

CupraEtch® SR 8000 Process

SoftClean UC Solution
25 – 30 °C / 15 – 30 s

CupraEtch® SR 8000 Solution
25 – 40 °C / 20 – 60 s

Post-Treatment
25 – 35 °C / 20 – 40 s

Figure 2: CupraEtch® SR 8000 process sequence

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InkPromotor T15

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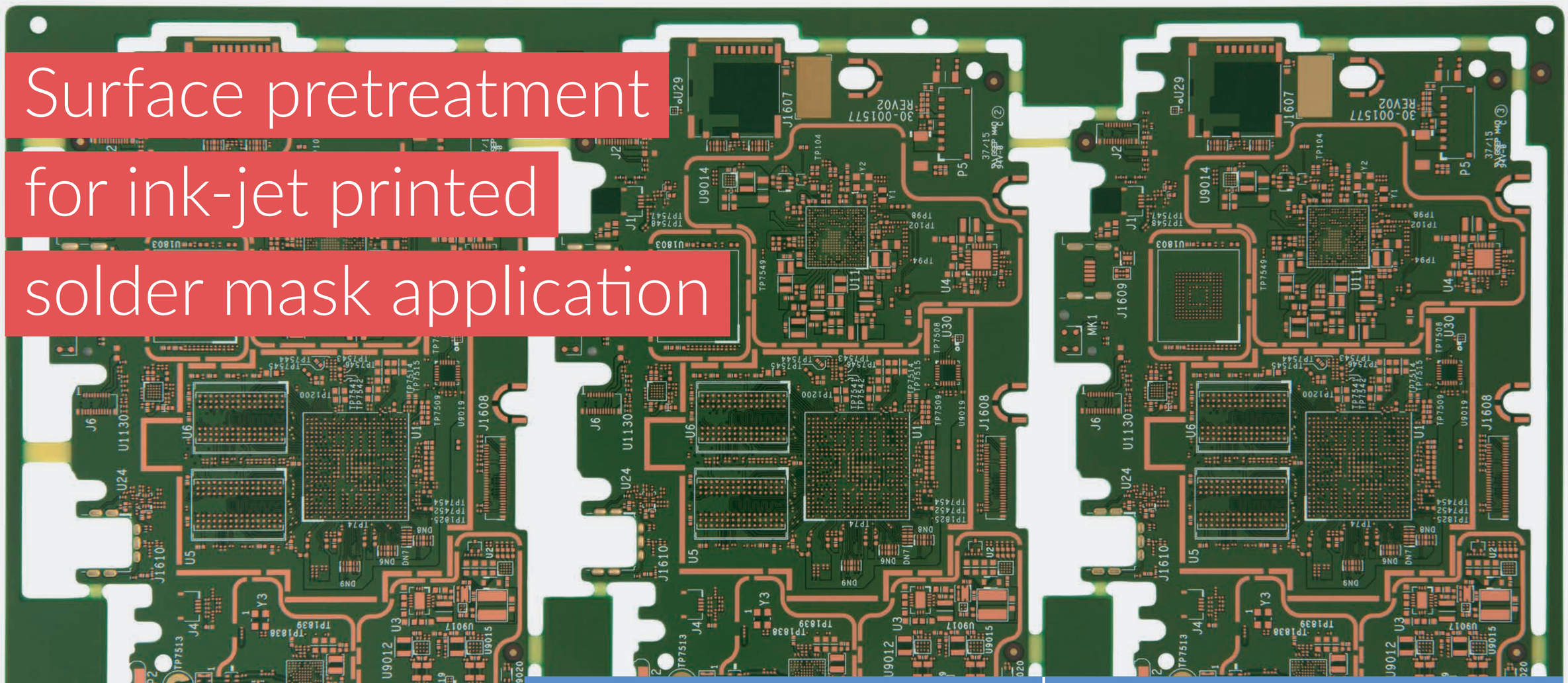
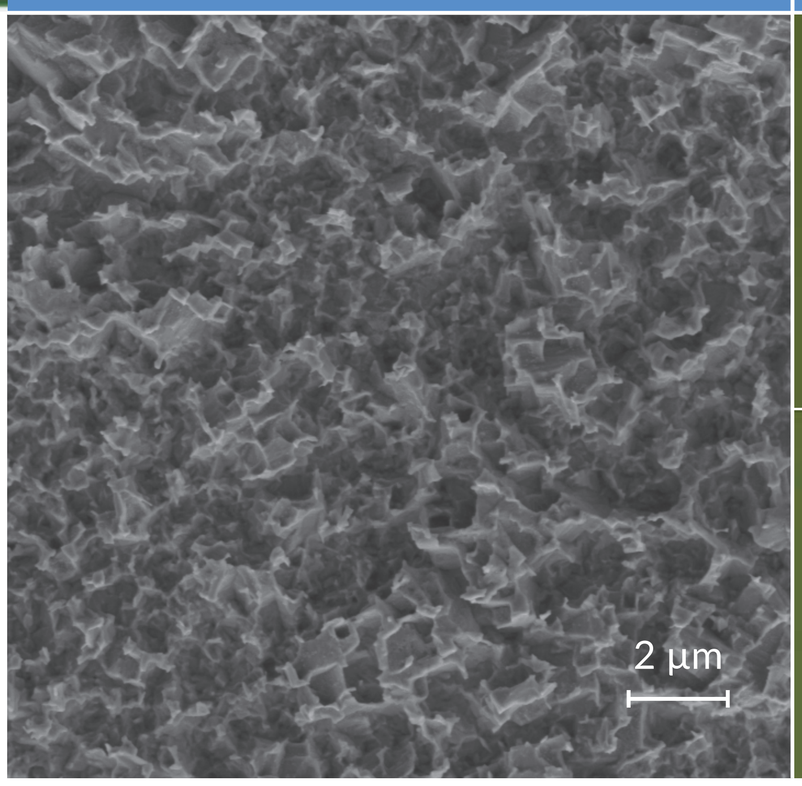
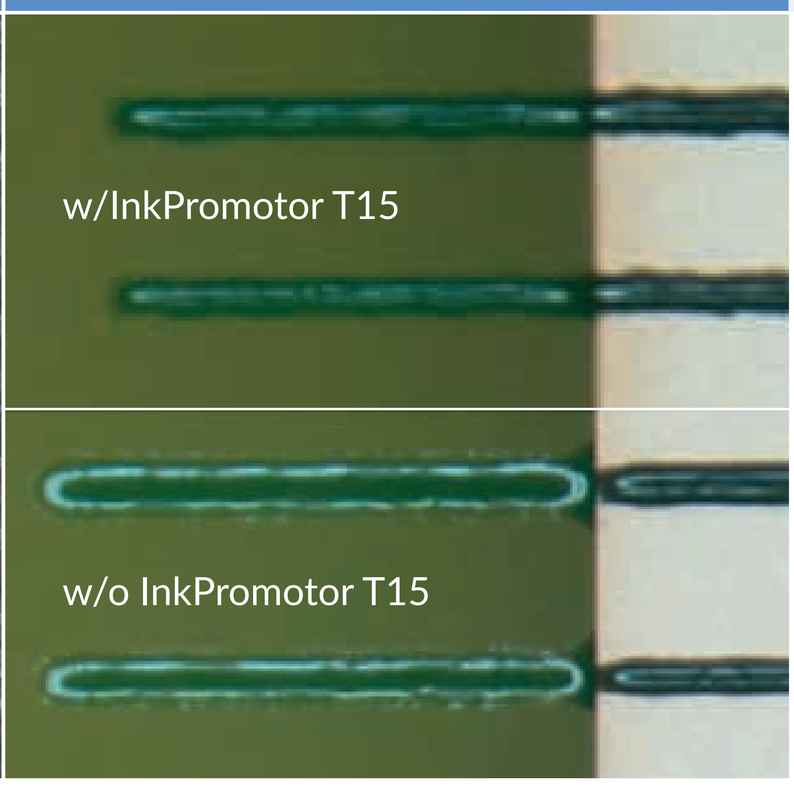
Surface pretreatment for ink-jet printed solder mask application



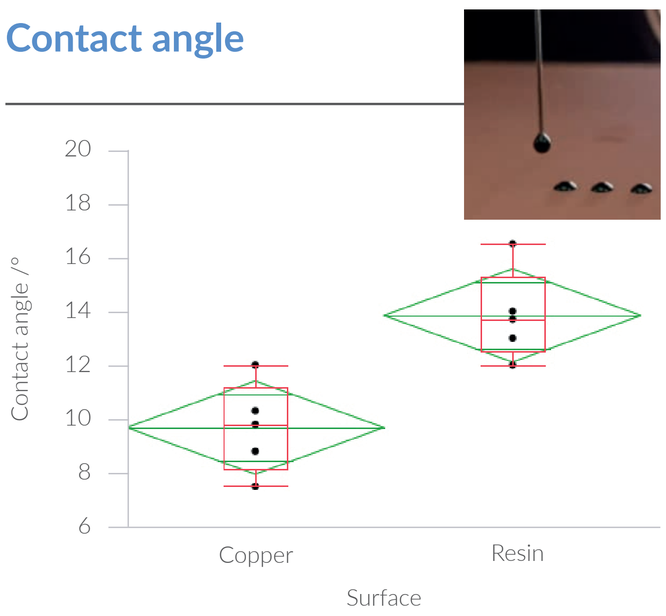
Copper surface morphology (SEM 5000x)



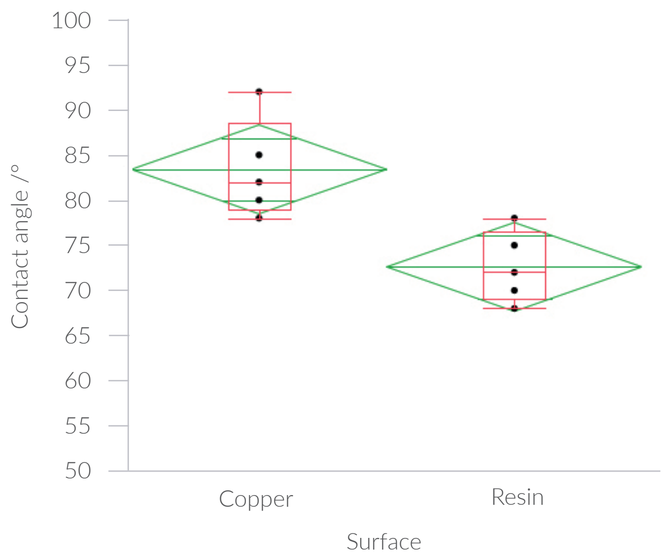
Ink-jet printed solder mask



Contact angle



InkPromotor T15



Improved resolution of ink-jet printed solder mask

InkPromotor T15 is an anti-bleeding agent for use in combination with a highly controllable cupric chloride-based micro etching system, CupraEtch® SR 8000. InkPromotor T15 is a simple one-step process that prevents the capillary action and therewith the excessive ink flow over the roughened surface referred to as a BLEED of the ink across the copper surface. It makes the ink-jet printing solder mask process with high line resolution possible. InkPromoter T15 is the new and innovative way to produce PCBs in an environmentally friendly way at low costs.

Features and benefits

- Best in class anti-bleeding agent
- Fine and uniform structures of printed solder mask on Cu and resin
- No detrimental effect on adhesion
- Simple analysis methods for easy handling and process control
- Worldwide availability upon request