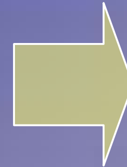
MECetchBOND CZ

Copper Surface Treatment System
for Advanced PWBs

Printed Wiring Board



The Trends of Increased Functionality and Reduced Size of Portable Wireless Products and Routing Densities for PWB

Customers Using MECetchBOND

Japan	95 Users (142 Lines)
Asia	45 Users(73 Lines)
Europe	41 Users(51 Lines)
USA	8 Users(10 Lines)

In 2004

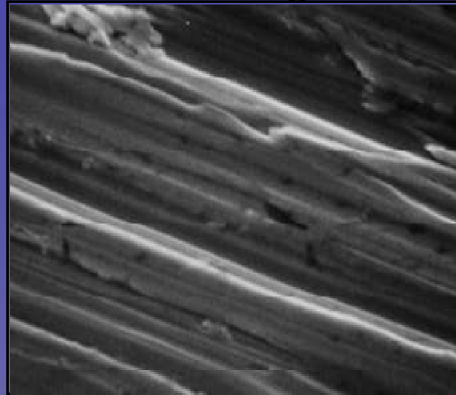
Application of MECetchBOND

Benefits of MECetchBOND

- Excellent adhesion to resins
- Fully conveyorized process
- Easy to control
- Proven process
- Reasonable cost
- Environmental friendly

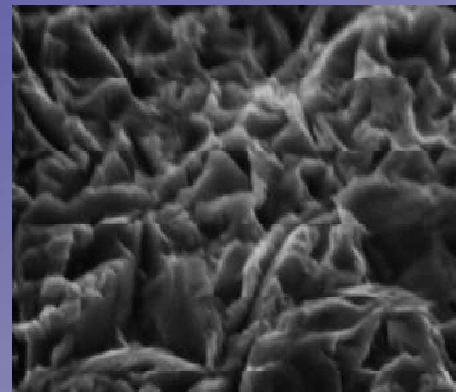
Copper Surface Topography

Buff Scrubbing ×5,000

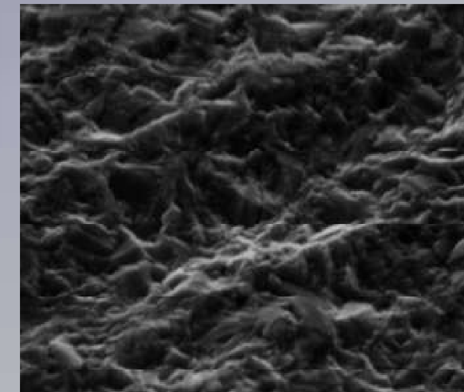


MECetchBOND CZ-8100 ×5,000

Black Oxide ×10,000



Jet Scrubbing ×5,000



H_2SO_4-H_2O_2 ×5,000

This chemistry is essentially a micro-etching process that roughens the copper surface, resulting in a unique topography.

MECetchBOND Process Flow

Note	Process step	Conditions
Pre-treatment for MECetchBOND	MAC-5330 / 3～5%HCl	20～30℃, 10～30sec **Spray pressure 0.1～0.2MPa**
	Rinse	
Can create steeper peaks and valleys Anchor Effect	MECetchBOND CZ-8100	Standard 35℃ (25～40℃) **Spray pressure 0.15～0.2MPa** Etching amount 0.5～3 μm
	Rinse	
	Acid Rinse	20～30℃, 10sec **Spray pressure 0.03～0.06MPa**
	Rinse	
	Dry	

Advantages of MECetchBOND

MECetchBOND CZ-8100

- -Can Enhance Mechanical Bonding (Anchor Effect)
- -Can Give Higher Adhesion
- -Simple Control
- -Fully conveyorized process

Physical Properties & Control

MECetchBOND CZ-8100	Replenisher CZ-8100R	Make-up Soln. CZ-8100M
Appearance	Colorless – Slight yellow transparent	Blue transparent
Specific Gravity (20℃)	1.11±0.01	1.13±0.01
pH	3.1±0.5	3.4±0.5

【Usage】

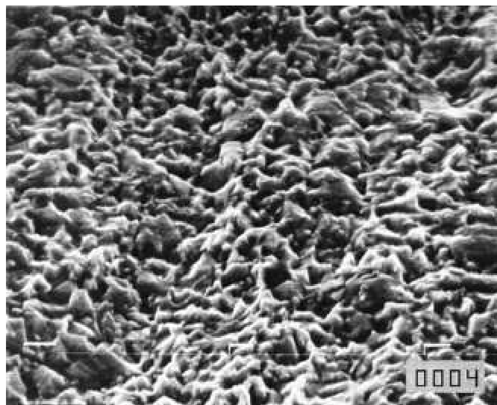
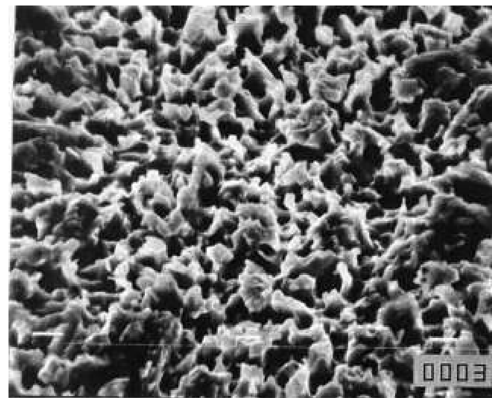
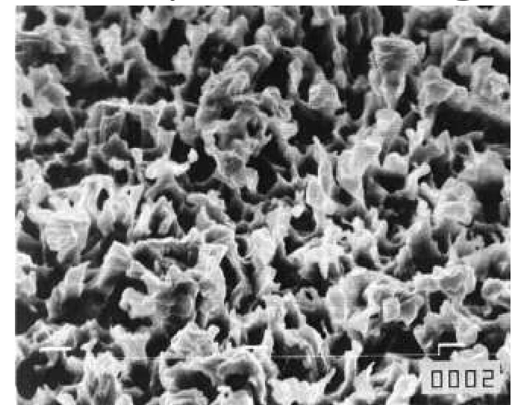
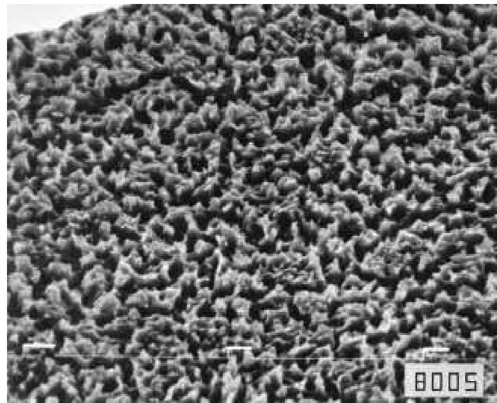
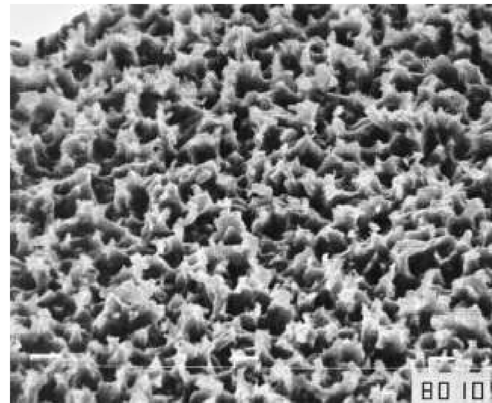
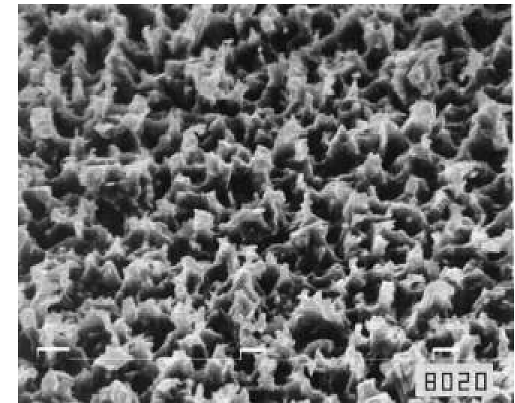
Make-up: Use CZ-8100M as it is.
Replenish: Use CZ-8100R as it is.

【Control】

1. Replenish the dragged-out amount.
2. Cu Concentration (15-30 g/L)
3. Concentration/Dilution (-10- +10%)

CZ-8100 Treated Topography

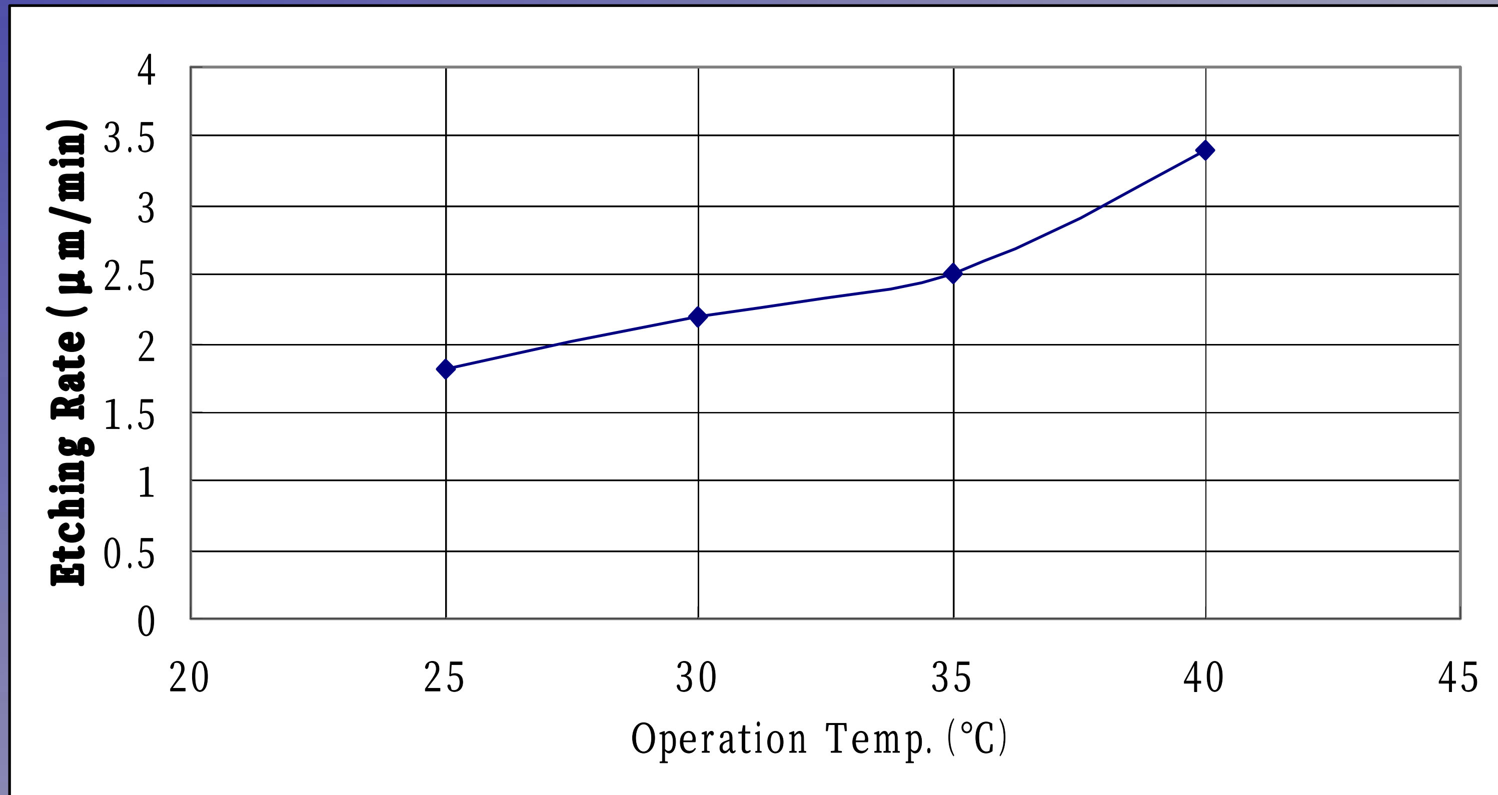
SEM ×5,000

	0.5μm etching	1 μm etching	2 μm etching
CCL			
Plated Copper			

Can decide some roughening variation for some application

Operation Temp. vs. Etching Rate

MEC Test Machine Data



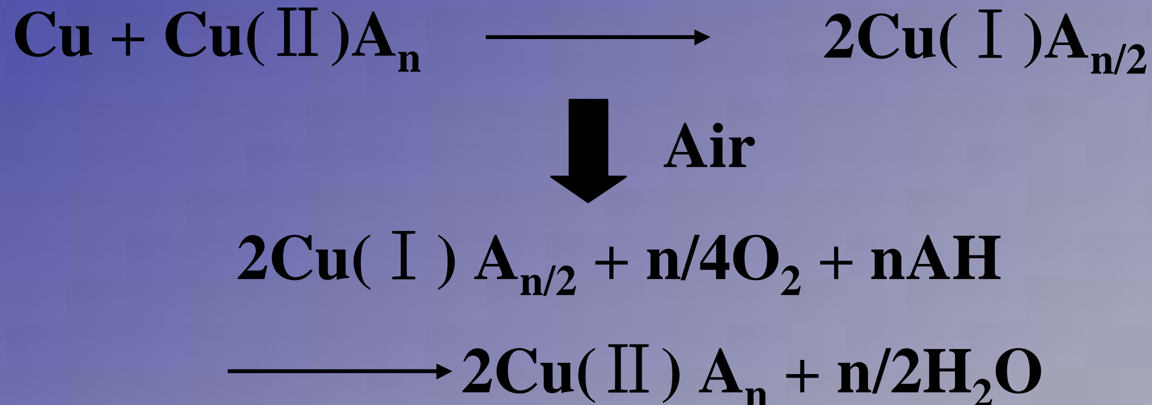
Standard Operation Conditions at 35℃

Copper Conc. vs. Etching Rate

MEC Test Machine Data

Control Range 15 – 30g/L

Etching Mechanism

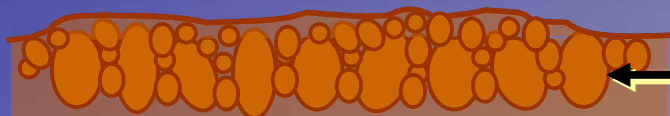


A : Weak Complexer
n : Coordination number

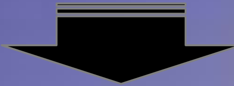
Copper reacts with a Cu(Ⅱ) complex in the solution to form a Cu(Ⅰ) complex. The formed Cu(Ⅰ) complex in the solution reacts with oxygen to generate a Cu(Ⅱ) complex. Such reactions accelerate dissolving of copper.

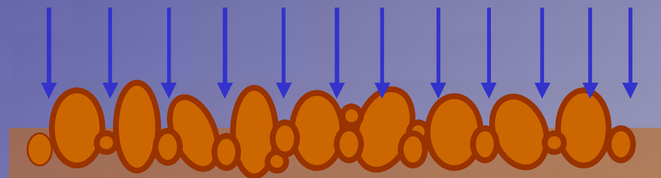
Topography Forming Mechanism

How can such a unique topography be obtained ?

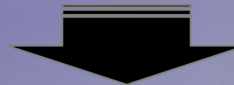


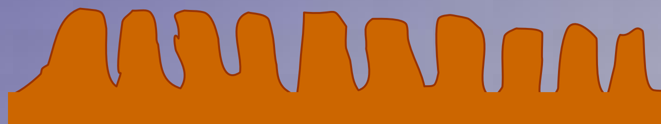
Copper grains





MECetchBOND CZ attacks boundaries faster than crystals.





Well roughened topography is left.

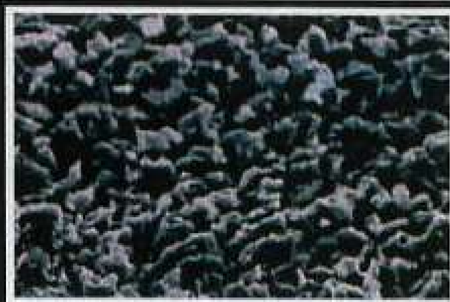
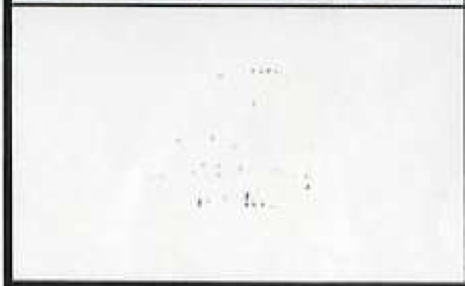
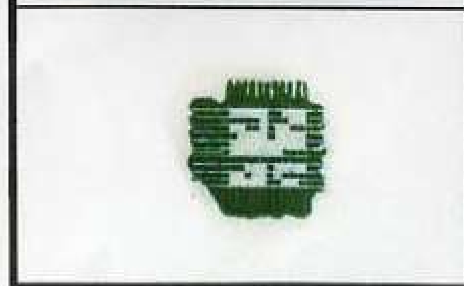
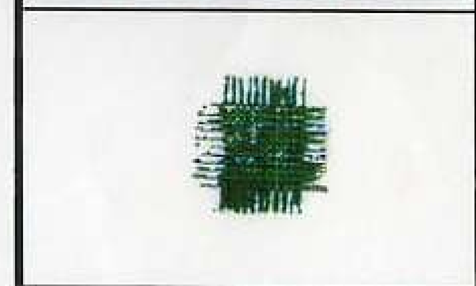
Etching Amount for Applications

- For pretreatment of Solder Mask Printing
    - Etching amount：0.5～2.0 μm
- For pretreatment of Dry Film Lamination
    - Etching amount：0.5～1.0 μm
- For pretreatment of Prepreg Lamination
    - Etching amount：1.5～3.0 μm
- For pretreatment of Micro-via Formation
    - Etching amount：1.5～3.0 μm

Adhesion (Solder Mask)

- Tape Peel Test-

Solder Mask Printing → Cross-cut → 3.5%HCl dipping(R.T., 10min) → Rinse&Dry → Tape on the cross-cuts → Peel

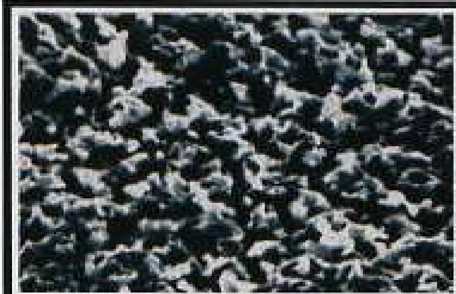
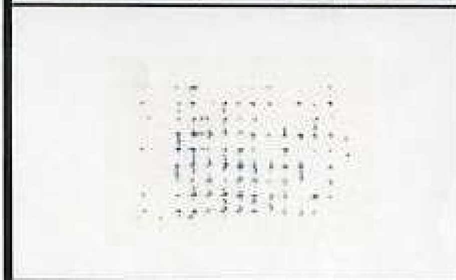
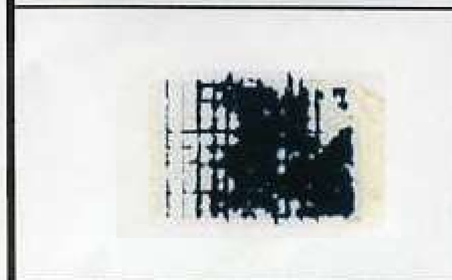
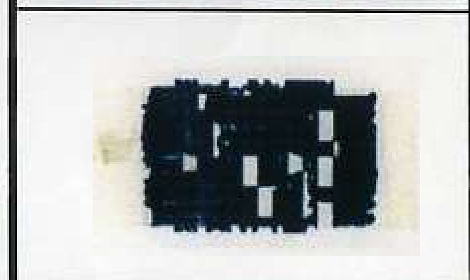
	MECetchBOND CZ-8100 (1.5 μm)	Conventional Microetchant (2 μm)	Buff Scrubbing
SEM ×3,500			
Tape Side			

No Peel off of Solder Mask with MECetchBOND Process

Adhesion (Dry Film)

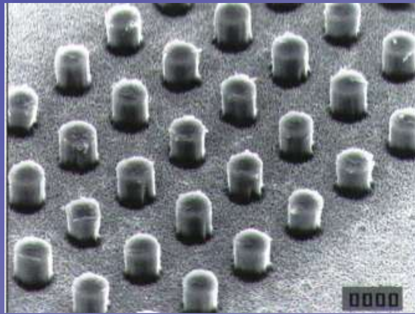
- Tape Peel Test-

Dry Film Lamination → Cross-cut → 3.5%HCl dipping(R.T., 1min) → Rinse&Dry → Tape on the cross-cuts → Peel

	MECetchBOND CZ-8100 (1 μm)	Conventional Microetchant (2 μm)	Buff Scrubbing
SEM ×3,500			
Tape Side			

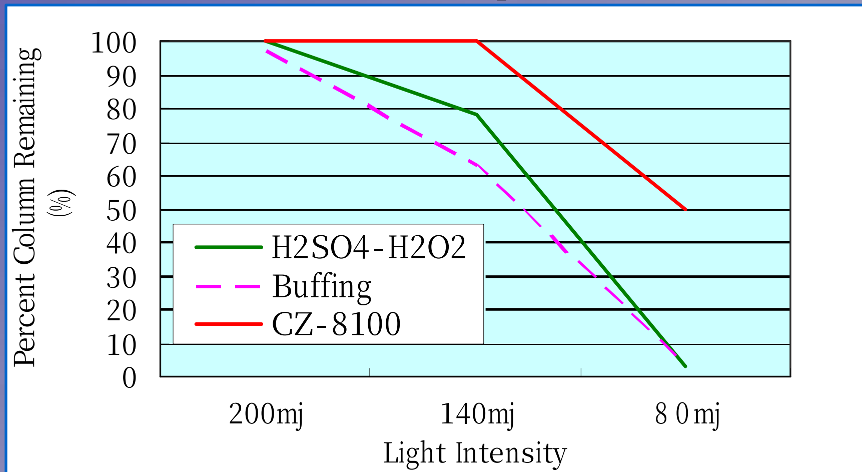
No Peel off of Dry Film with MECetchBOND Process

Adhesion (Dry Film)

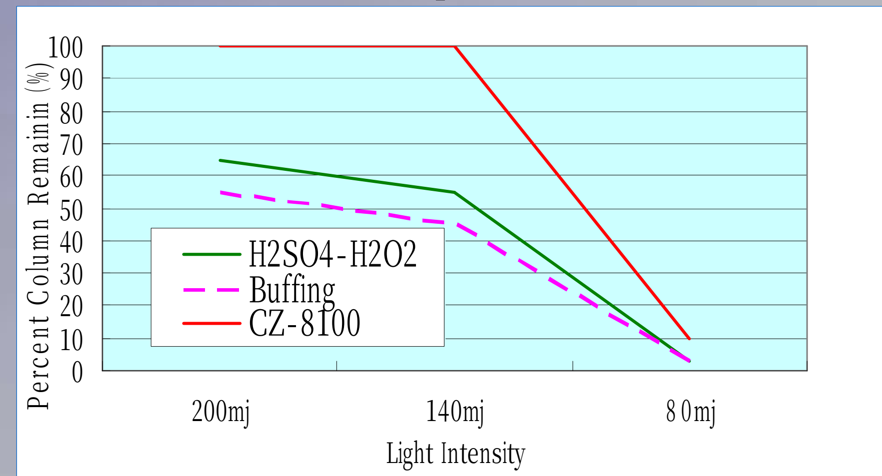


Column patterns with 10 μ m-30 μ m diameter are formed latticedly.
Evaluation Conditions : sparse space / dense space

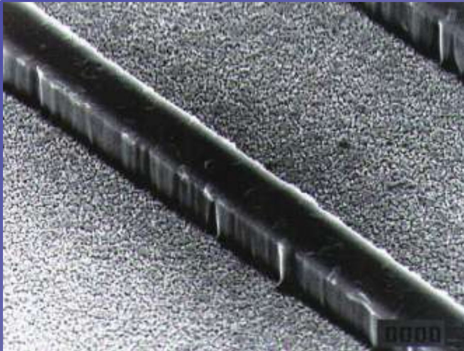
Dense Patterns
Column Pattern Diameter / Space＝20 μ m/20 μ m



Sparse Patterns
Column Pattern Diameter/ Space ＝20 μ m/60 μ m



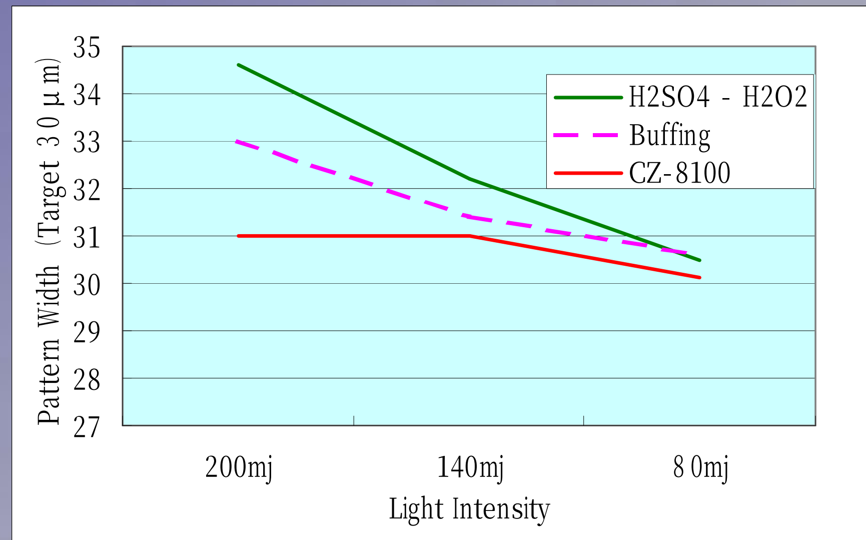
Resolution (Dry Film)



Procedures

- Measure the targeted width and the actual width.
- A condition of light intensity is ;
  80mj/cm², 140mj/cm² and 200mj/cm².

Line/Space=30/30 μ m



Summary of MECetchBOND

- Adhesion between copper surface and resin has become more and more important.
- MECetchBOND CZ can enhance mechanical bonding.
- MECetchBOND system can give excellent adhesion and high reliability.
- *MECetchBOND system is what you need for various applications!*