

MEC SURFACE PREPARATION



WIM ONGENAE
17-18 MARCH 2005
St-Petersburg, Russia

Several options depending on:

- Application
- Equipment (metal parts)
- Technological requirements

MECBRITE SERIES

H₂SO₄ / H₂O₂ based

MECBRITE CA-92/CA-95

(degreasing, etching and anti-tarnish in one)

- Prior IL DF ($L/S > 100 \mu\text{m}$)
- Prior to IL Liquid Resist
- Prior to OSP
- Prior to HASL
- Prior to UV ink printing

–Cu capacity : 45 g/L

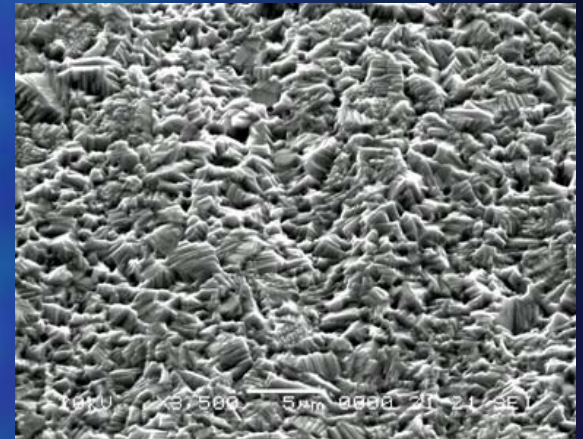
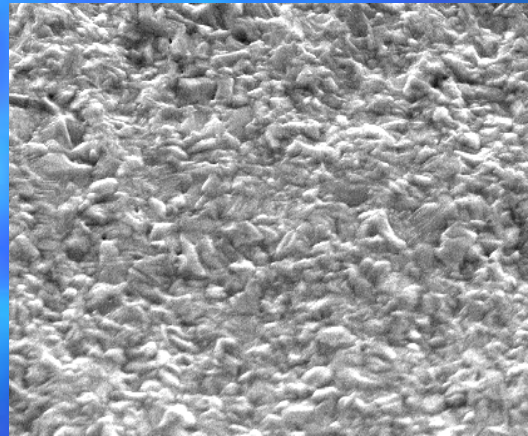
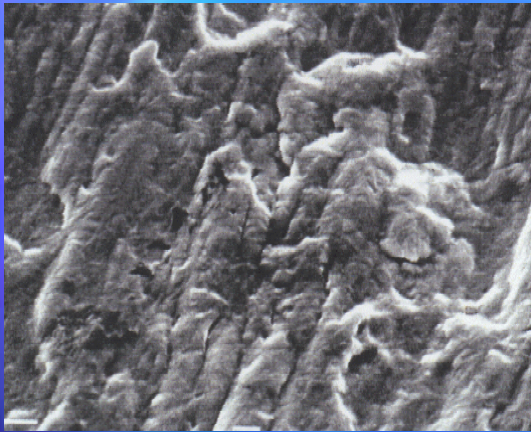
MECBRITE CA-5560 RL1

(high capacity micro-etch)

- Prior IL DF ($L/S < 100 \mu\text{m}$)
- Prior to IL Liquid Resist
- Prior to HASL
- Prior to UV ink printing

–Cu capacity : 55 + g/L

TOPOGRAPHY



BLANK

CA-92/CA-95

CA-5560 RL1

Etch rate = 1,0 μm

PROCESS

MECBRITE CA-...
RT, 1-2 bar
10-30 sec

WATER RINSE
3-step cascade

DRY

For CA-5560 one step
5% H₂SO₄ rinse required

EQUIPMENT MATERIAL FOR MECBRITE

CAN BE USED

SS 304
SS316
RIGID PVC
RIGID PP
RIGID PE
SS WELDED
RIGID PPE
SOFT PVC
FOAMED POLYMER

PARTLY USABLE

SOFT THERMORUN

CANNOT BE USED

TITANIUM

SOFT EPT

TITANIUM WELDED

MECETCHBOND

Unique surface treatment

developed by MEC

Process

- Cleaner MAC 5330 RTU
- Rinse
- Dry, Pre Dip or Squeeze
- MECETCHBOND CZ 8100 / CZ-2001
- Rinse
- Acid rinse
- Rinse
- Dry

MAC-5330 RTU

Features

- **H₂SO₄/H₂O₂ type acid cleaner**
0.1-0.3m mild etching

- **Can eliminate contaminants for MEB**

Finger print, additive of plating, DF stain and so on

MAC-5330 RTU

How to use

- Ready to use
- 10-15sec contact at 25°C

MAC-5330 RTU

Control method

- **Copper conc.: Max.40 g/L**
- H₂O₂ conc.: more than 30 g/L
- H₂SO₄ conc.: more than 90 g/L

MAC-5330 RTU

Pretreatment agent	MAC-5330 RTU	Hydrochloric acid	Caustic soda	Conventional MEC degreasing agent
Fingerprints	○	×	△～×	△
Copper plating additive (A)	◎	×	◎	○
Copper plating additive B)	◎	◎	×	—
DF adhesive	◎	×	×	—
Soluble ink from AOI check	◎	×	◎	△
Anti-tarnish	○	◎	○	△
Rust remove	○	○	×	○
Effect on MECetchBOND	○	○	○	×

◎:Very good,○:good,▲:acceptance,X:no good

MAC-5330 RTU

- Prior to MECetchBOND
ILDF/OLDF and SR application

ILDF: Eliminate heavy chromate

OLDF: Eliminate plating additives and DF scum

SR: Eliminate anti-tarnish agent

EQUIPMENT MATERIAL FOR MAC-5330

CAN BE USED

SS 304
SS316
RIGID PVC
RIGID PP
RIGID PE
SS WELDED
RIGID PPE
SOFT PVC
FOAMED POLYMER

PARTLY USABLE

SOFT THERMORUN

CANNOT BE USED

TITANIUM

SOFT EPT

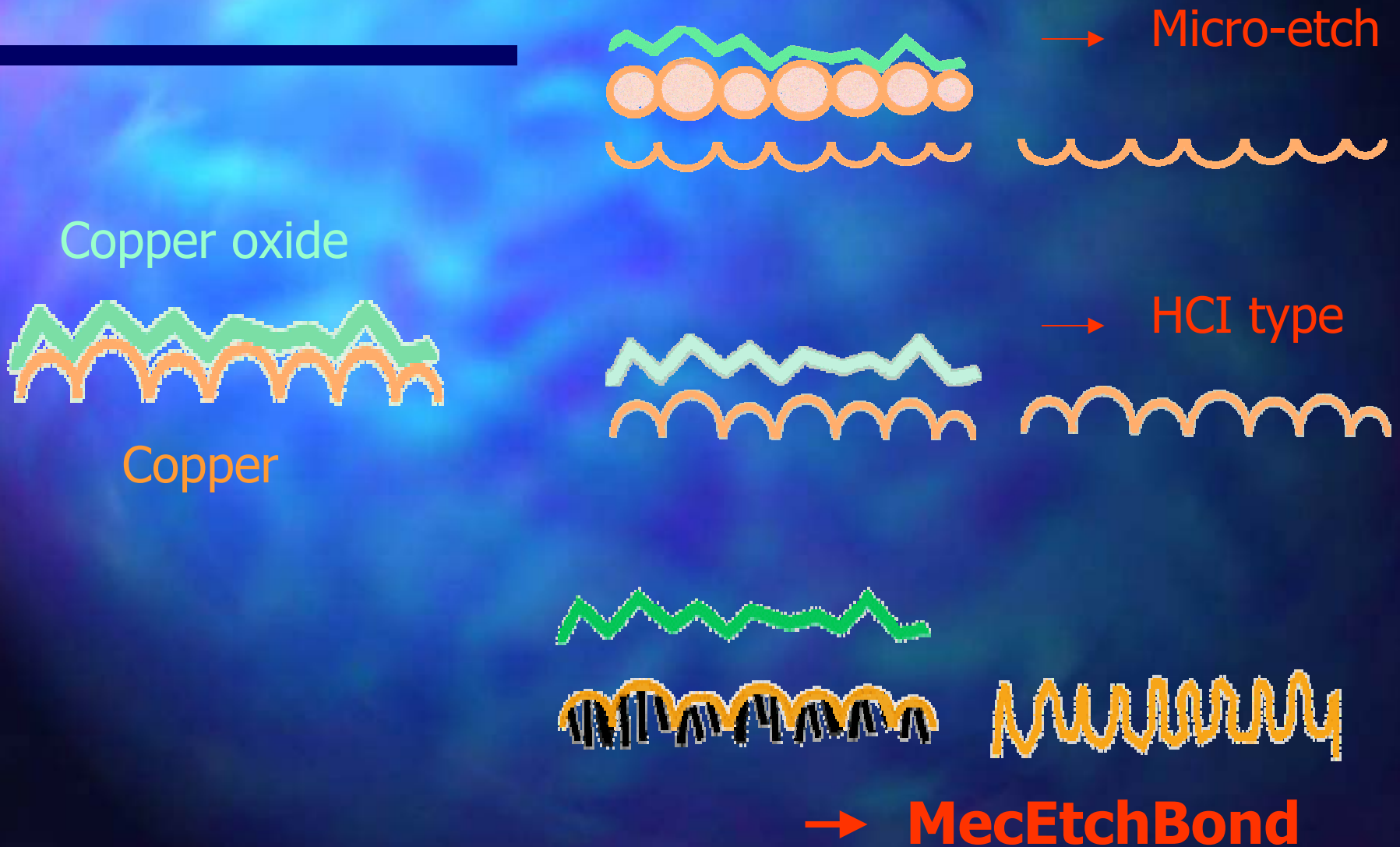
TITANIUM WELDED

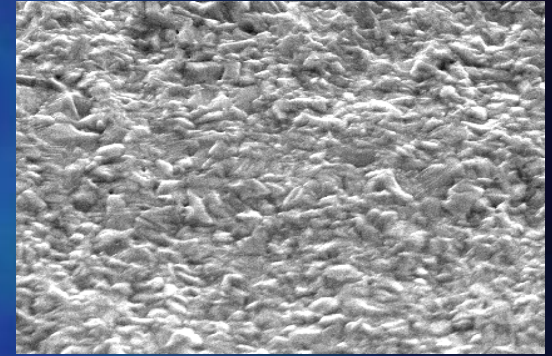
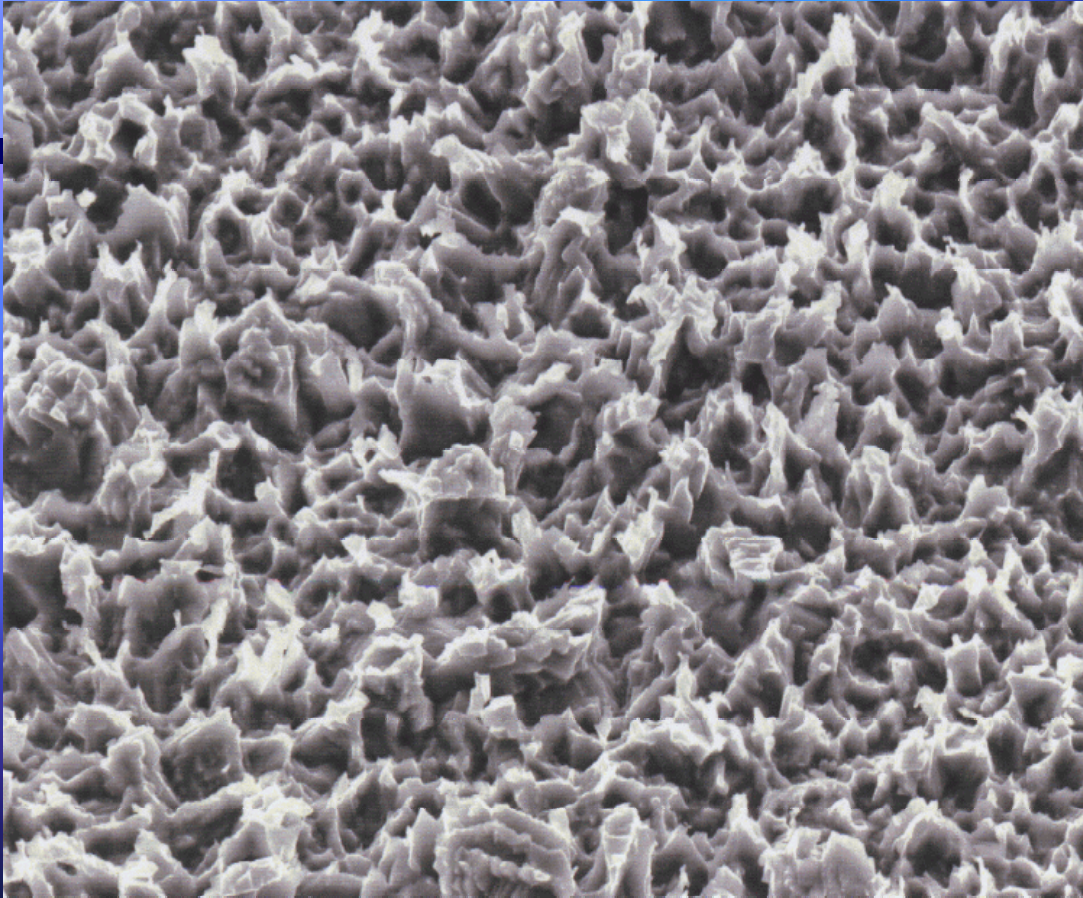
MECETCHBOND

WHAT IS IT ?

HOW DOES IT WORK ?

MECHANISM





NaPS
H₂SO₄ / H₂O₂

**IT CREATES AN UNKNOWN SURFACE
ROUGHNESS OF COPPER**

MEB CZ-8100/CZ-2001 APPLICATIONS

- DRY FILM
- SOLDER MASK
- MICRO VIA RCC
- PLASTIC BGA
- BO ALTERNATIVE

MEB PROCESS PRIOR SM/DF

MAC-5330 RTU + RINSE

CZ-8100/CZ-2001
30-40°C (standard 35°C)
1-2 bar
25-30 sec.

WATER RINSE

ACID RINSE
20-30°C
0.5-1.5 bar
10-20 sec.

(D.I.) WATER RINSE

DRY

EQUIPMENT MATERIAL FOR MEB

CAN BE USED

TITANIUM
RIGID PVC
RIGID PP
RIGID PE
RIGID ULMOLER/PE
(typ resin)
RIGID PPE
SOFT PVC
FOAMED POLYMER
TITANIUM WELDED

PARTLY USABLE

SOFT THERMORUN

CANNOT BE USED

SS 304
SS316
SOFT EPT
SS WELDED

MECETCHBOND CZ-8100/CZ-2001

Physical Properties

	Make-up	Replenisher
Appearance	Blue clear liquid	Yellow clear liquid
S.G. (at 20°C) CZ-8100	1.13	1.11
S.G. (at 20°C) CZ-2001	1.09	1.07

How to make-up

☞ For make-up use CZ-8100 M / CZ-2001 M

How to use

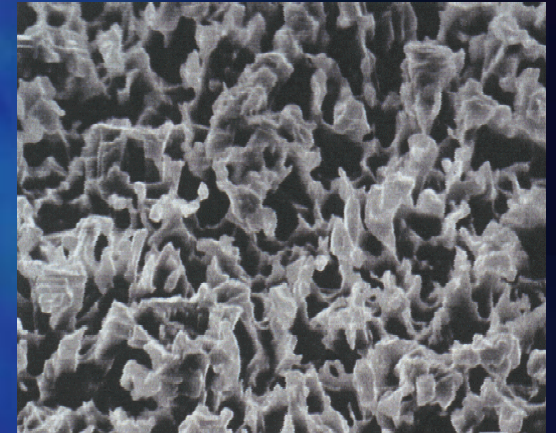
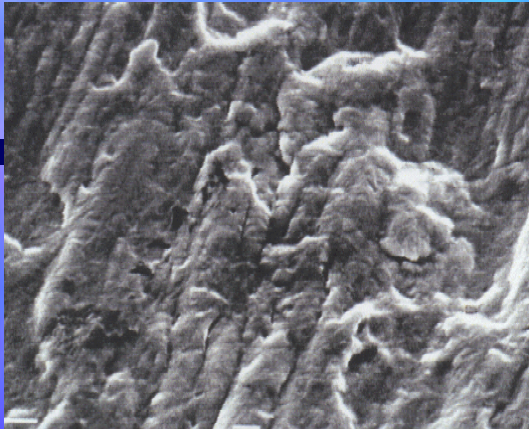
Temperature : 35°C
Contact time : 20 - 40 sec. depending on application
Spray pressure : 1.0 - 2.0 bar

How to control

1. Drag-out compensation
2. Control copper concentration
3. Control concentration/dilution of the working solution

CZ-8100

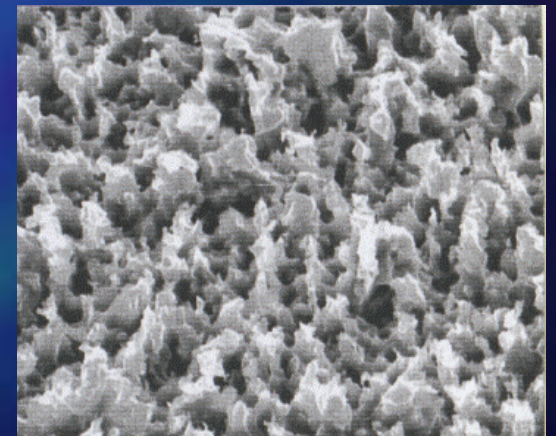
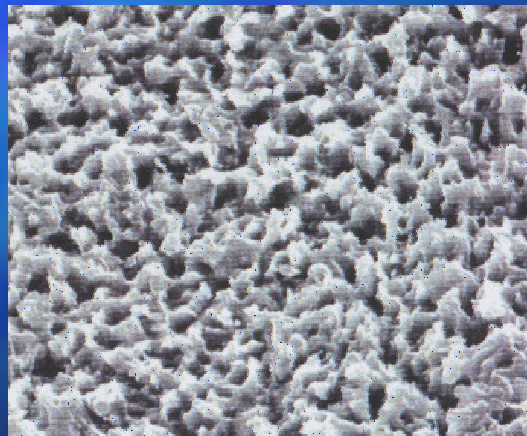
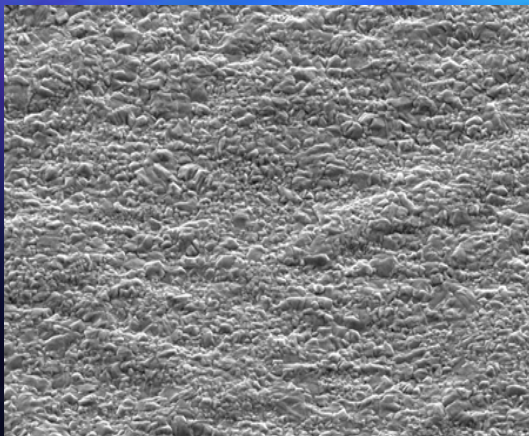
Copper Foil



BLANK

1µm etch

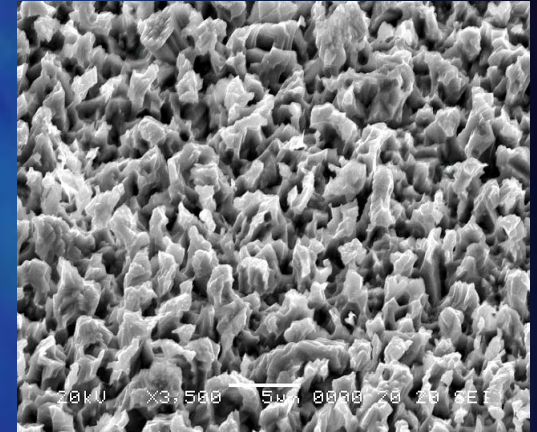
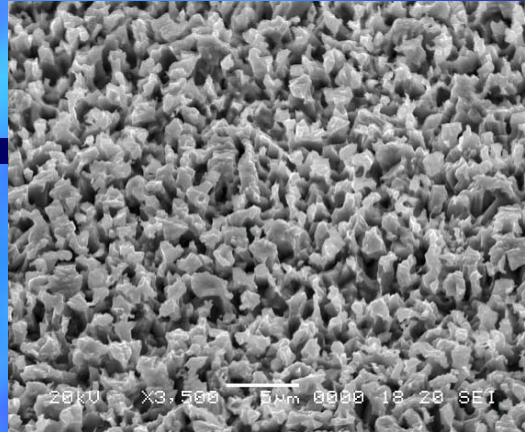
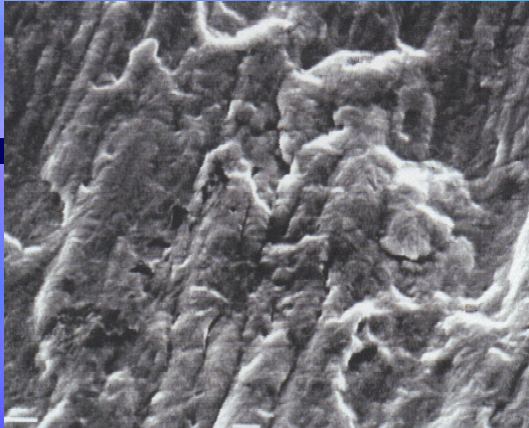
2µm etch



Plated copper

CZ-2001

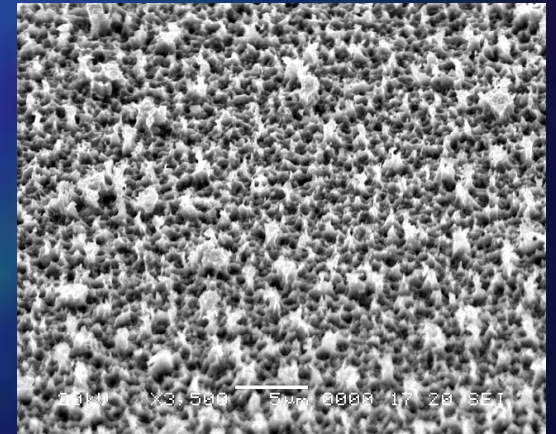
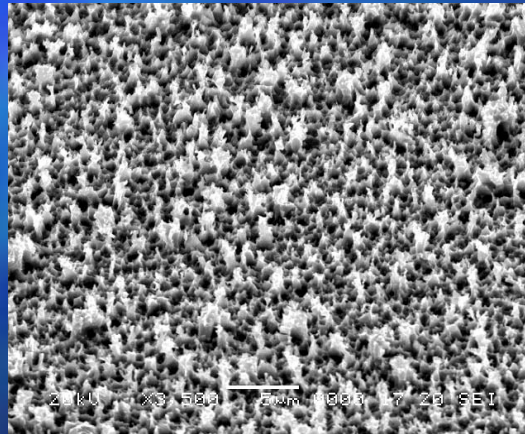
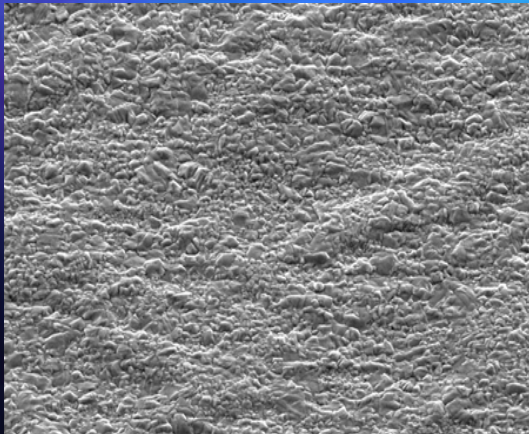
Copper Foil



BLANK

1 μm etch

2 μm etch



Plated copper

PERFORMANCE

-DRY FILM ADHESION

-SOLDERMASK PEEL TEST

RESISTANCE TO ENIG (Ni-Au)

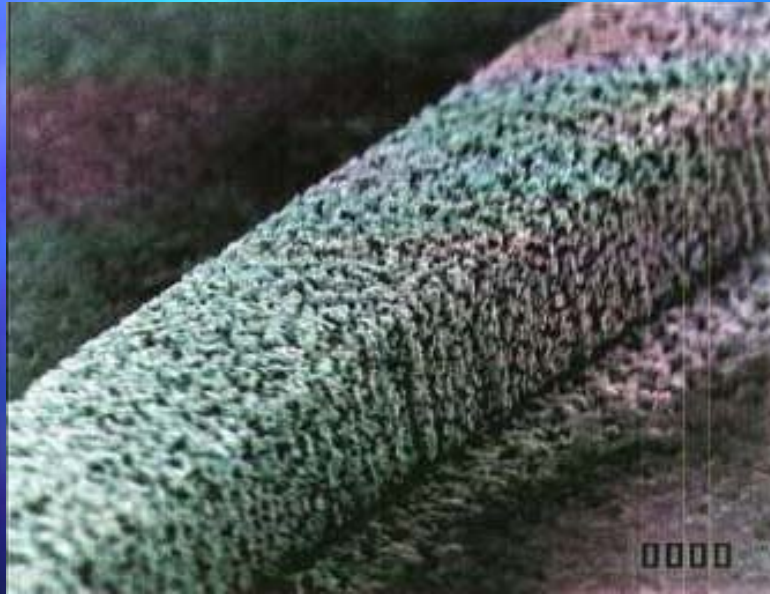
RESISTANCE TO E-Sn

Improved Yields due to better adhesion of DF

- Up to factor 10 depending on Cu type
 - CCL
 - Panel Plated Cu
 - Rolled Annealed (RA) Cu
- Very effective results for $L/S < 100 \mu\text{m}$ with high resolution
 - Proven track record all over Europe and Asia

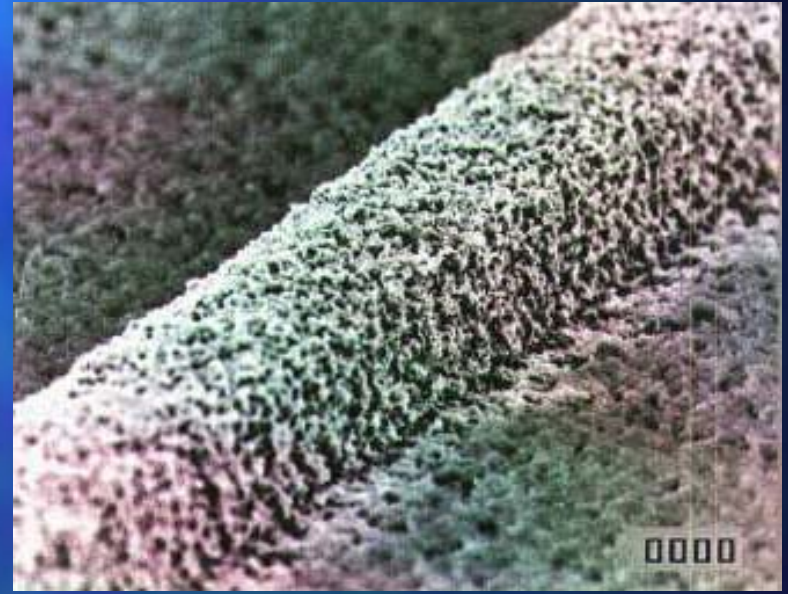
Example

CZ-2001



Etch rate: $1.0 \mu\text{ m}$
L/S=30/200

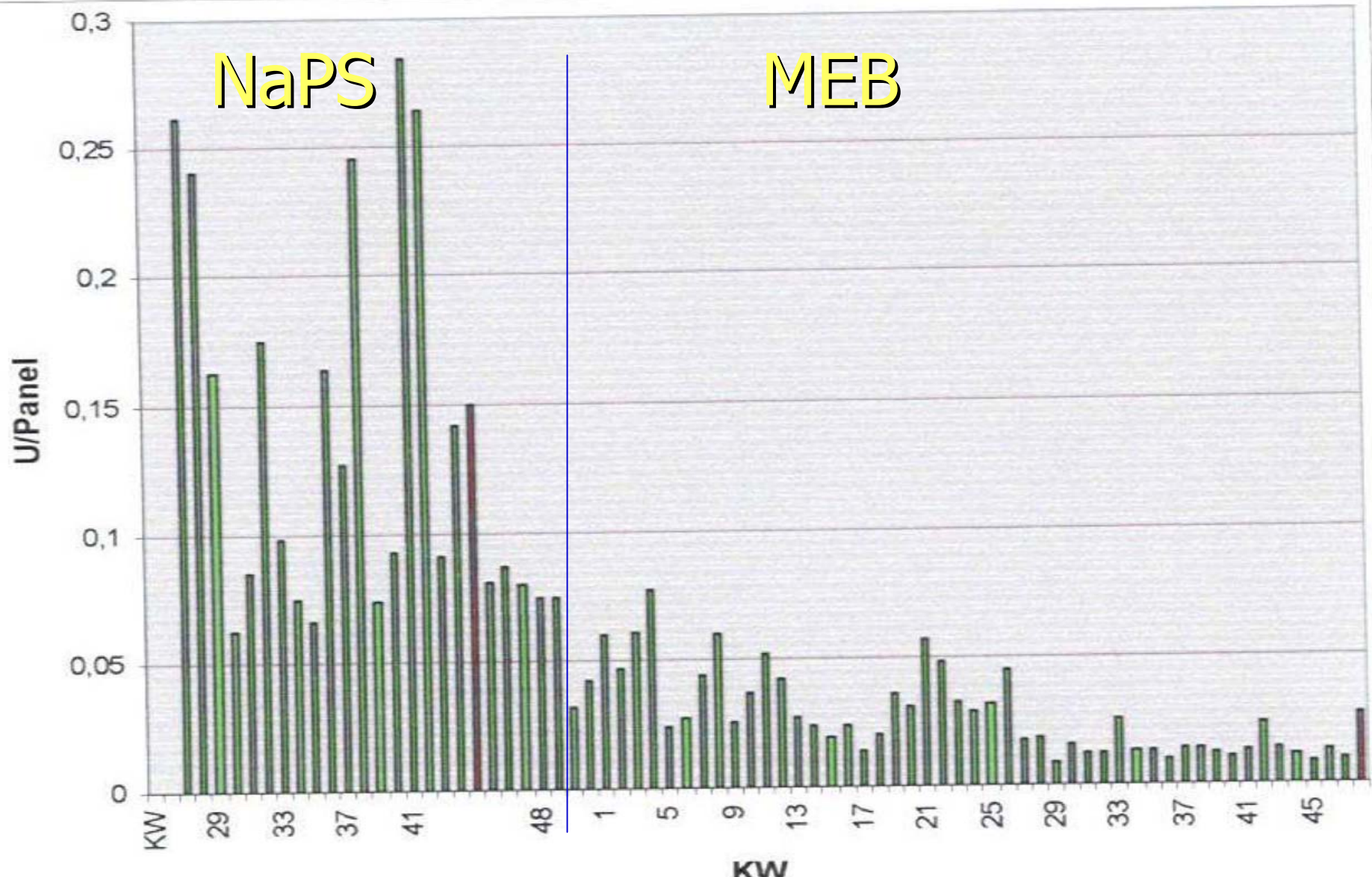
CZ-8100



Etch rate: $1.0 \mu\text{ m}$
L/S=30/200

Mag.: $\times 1500, 75^\circ$

Example II (# Opens)



SOLDER MASK PEEL TEST

(Test Method)

Copper Surface
Treatment

Machinal scrubbing : Buffing
Chemical Scrubbing : 1) CZ-8100 / CZ-2001
2) CB-800 (H₂SO₄-H₂O₂ Type)

S/M Printing

S/M : PSR-4000 Z-26 (Taiyo Ink)
Exposure : 300 mj
Precure : 80°C for 30 min.
Development : 1 wt% Na₂CO₃ at room temperature
Postcure : 150°C for 40 min.

Crosshatch

Deterioration

Immerse into 10% HCl for 10 min., then rinse with water and dry

Peel Strenght

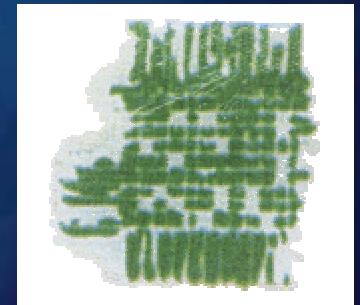
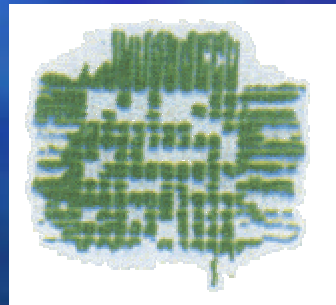
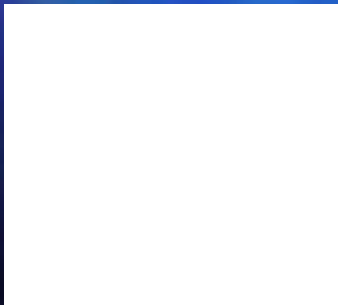
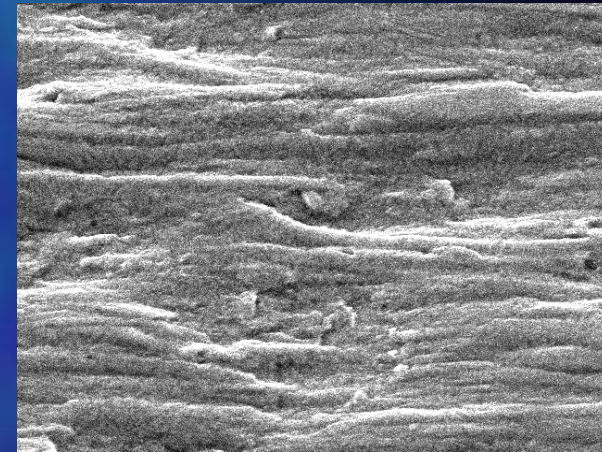
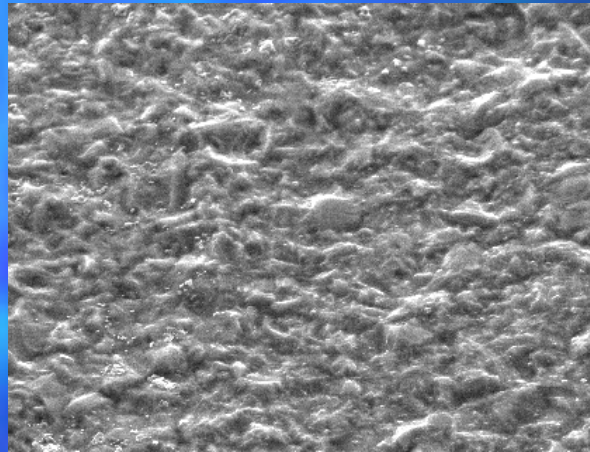
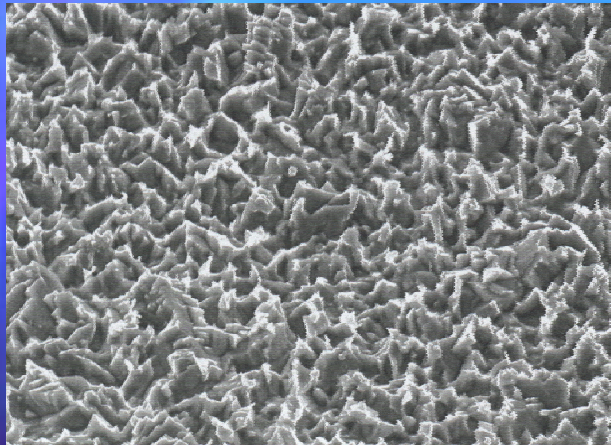
Tape on crosshatch, then peel it

SOLDER MASK PEEL TEST

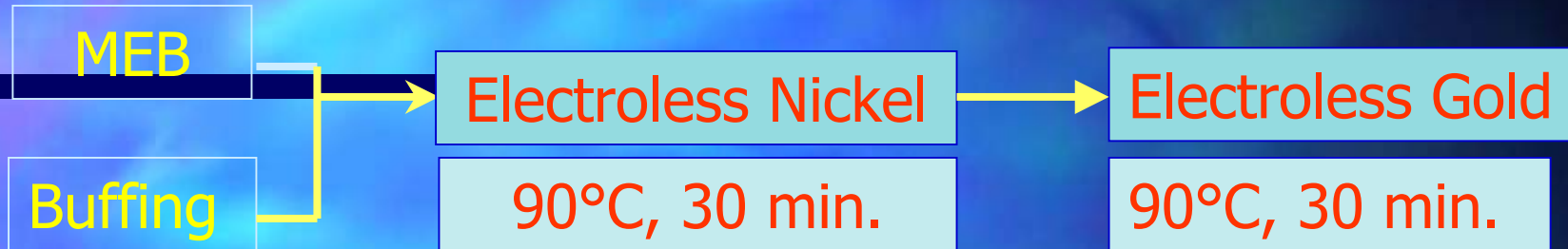
H₂SO₄ - H₂O₂ type
Or NaPS

CZ-8100/CZ-2001

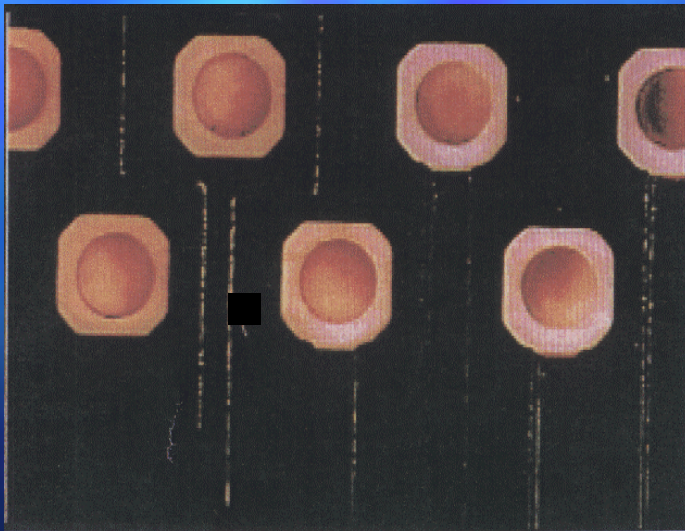
Buffing



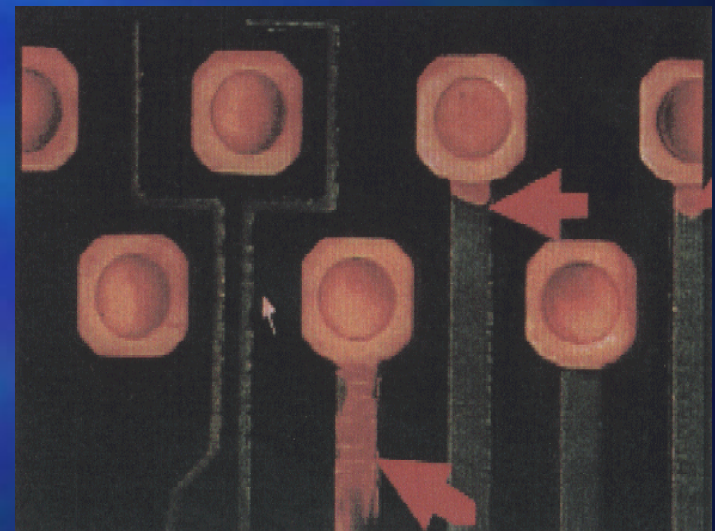
RESISTANCE TO ELECTROLESS NICKEL-GOLD



CZ-8100/CZ-2001



Buffing



RESISTANCE TO ELECTROLESS TIN

- No Solder Mask lifting !
- No infiltration of Tin under the Mask !
- More independant regarding type of Mask !

S.I.R. (JIS Z 3197 6.8)

Test Board : Comb pattern board (Glass Epoxy G-10)
Humidification : 40°C 95% RH

Initial Value	More than $1 \times 10^{13} \Omega$
After 96 hours	More than $1 \times 10^{12} \Omega$

IONIC CONTAMINATION (MIL-STD-2000A)

Test Board : Copper Clad Bord 25 x 12.5 cm
Test equipment : Omega Meter Model 600

Conditions Solution Temperature : 30°C
 Contact time : 30 sec. - 45 sec.
 Spray Pressure : 1.0 kg/cm²
 Water rinse : Rinse with water for 3 steps
 after solution contact

CZ-2001
CZ-8100

0,05 µg NaCl/cm²
0,27 µg NaCl/cm²

H2SO4 - H2O2
MICROECHANT

0,54 µg NaCl/cm²

MEB PROCESS AS BLACK OXIDE ALTERNATIVE

MAC-5330 RTU + RINSE

CZ-2001
30-40°C (standard 35°C)
1-2 bar
40-60 sec.

WATER RINSE

ACID RINSE
20-30°C
0.5-1.5 bar
10-20 sec.

WATER RINSE

ADHESION PROMOTOR
CL-2301
20 sec. at RT, spray

(D.I.) WATER RINSE

DRY

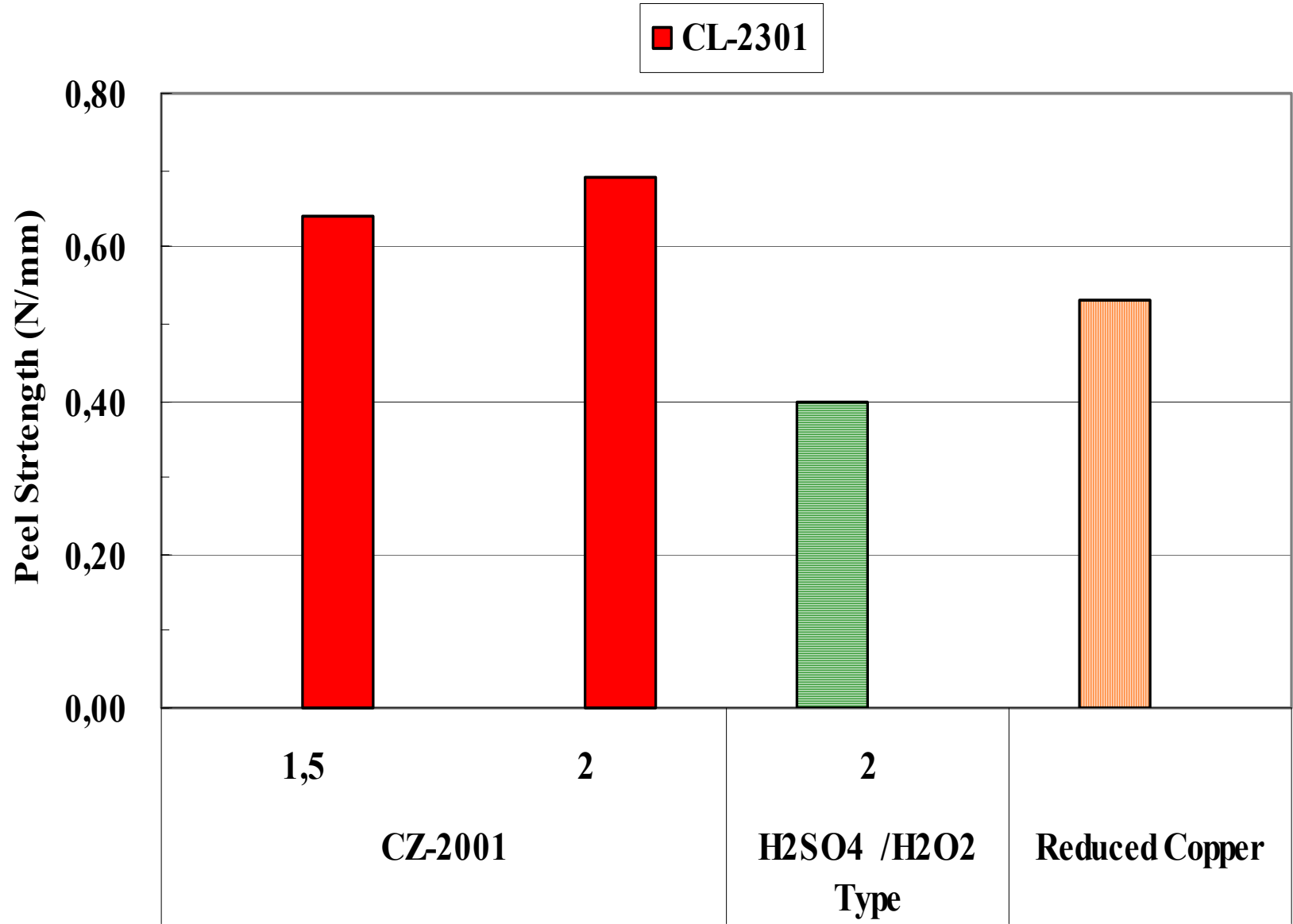
FEATURES

- Mechanical adhesion (= rough topography by CZ-2001)
- Chemical adhesion (= adhesion promotor by CL-2301)

➡ **Excellent adhesion**

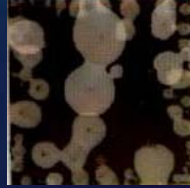
- No delamination !
- Optimal peelstrenghts !

Peel Strength: MCL-E-679 (Hitachi) FR-5 Class FR-4, Prepreg: GEA-679N



Delamination Test: MCL-E-679 (Hitachi)

FR-5 class FR-4, Prepreg: GEA-679N

		PCT 8hrs→Solder Dip 30secs			
		250°C	260°C	270°C	280°C
CZ-2001 1.5 μ m	CL-2301				
CZ-2001 2 μ m	CL-2301				
Reduced Copper					

**Results on All Other Materials
Available Upon Request**