



## High Performance Acid Copper Plating System PC-3000

### PROPERTIES & APPLICATION:

1. Rapid depositing rate and bright plating, extremely high leveling and brightness.
2. A mirror bright deposit can be obtained in the wide range of current density, as well as extremely high leveled brightness at low current density region.
3. Wide range of working temperature. Good bright deposit may be obtained at 18-30°C.
4. High impurity tolerance. It is not easy to produce pinholes, pits and white haze on deposit.
5. Easy to operate, low brightener consumption .
6. The brightener has high stability and good compatibility. It can mix with any acid copper brightener, and easy to change bath.

### BATH COMPOSITION & OPERATION CONDITION

| Composition              | Range                    | Standard                                     |
|--------------------------|--------------------------|--|
| Copper Sulfate           | 180-220 g/l              | 200 g/l                                      |
| Sulfuric Acid            | 40-90 g/l                | 65 g/l (i.e.,32.6cc/, Specific Gravity=1.84) |
| Cl <sup>-</sup>          | 50-100 mg/l              | 80 mg/l                                      |
| PC-3000C Make-Up         | 4-6 ml/l                 | 4 ml/l                                       |
| PC-3000A Brightener      | 0.5-0.7 ml/l             | 0.6 ml/l                                     |
| PC-3000B Leveler         | 0.5-0.7 ml/l             | 0.5 ml/l                                     |
| Temperature              | 18-30°C                  | 25°C   |
| Cathodic current density | 1.5-8 A/dm <sup>2</sup>  |  |
| Anodic current density   | 0.5-30 A/dm <sup>2</sup> |  |
| Agitation                | Air/mechanical           |  |
| Voltage                  | 2-10V                    |  |

## BRIGHTENER FUNCTION

**PC-3000C (Make-Up):** Used for preparing fresh bath, changing/filtering bath or adding copper sulphate. Aid brightener 3000A and 3000B for obtaining high leveling bright deposit and removing pinhole.

**PC-3000A:** Improving plating quality in low current density region. Excessive 3000A will result in potential difference across the base and burning at high current area. To balance add 3000B.

**PC-3000B:** Used for obtaining high leveling bright deposit.

Replenishment of additives at normal operating condition:

Consumption: PC-3000A: 30-100 ml/ KAH, PC-3000B: 30-100 ml/ KAH

## NORMAL MALFUNCTION & REMEDY

### 1. Poor brightness of deposit

Replenish PC-3000A: 0.3ml/L, PC-3000B: 0.2ml/L

### 2. Poor leveling ability at low current region

- a) Less brightener at low current region, replenish CN-3000A 0.3~0.5ml/L
- b) Low Sulfuric acid content, add it to 60~70.g/L
- c) High temperature, if over 35°C, add brightener properly and keep temperature under 30°C.
- d) Too much organic impurities, filter it with 2~3g/L activated carbon.

### 3. Burning at high current density region, deposit is rough and has stripes.

- a) Low Copper sulphate content, add it to 180~220g/L
- b) Less PC-3000B present, replenish 0.2~ 0.3ml/L
- c) Too much PC-3000A, replenish PC-3000B 0.2~0.3 ml/L or PC-3000C 0.2~0.3ml/L.
- d) Not enough chloride ion, less than 20mg/L, replenish hydrochloric acid 0.1ml/L

### 4. Deposit appears rough and has pinholes

- a) Not enough PC-3000C (MU), replenish 1~2ML/l
- b) Suspending matter on the bath, strengthen filtration (Titanium basket bag has pole or carbon powder)

### 5. Spots on the deposit

- a) Organic impurities contamination, treat it with hydrogen peroxide and activated Carbon.
- b) Too much Cu<sup>+</sup>, check phosphorous content of Copper anode (0.03~0.05%),

## MAINTANENCE & MANAGEMENT OF BATH

### Concentration of the bath:

1. About 20°Be at 25°C.
2. PH < 1, management is not necessary.
3. Bath temperature is in the range of 10-40°C, choose 20-30°C. (If bath temperature is higher than 35°C, brightness will decrease, and the consumption of the brightener will increase. In this case, it is better to cool bath.)
4. The phosphorus content of the anode should be 0.03-0.05% (Using other copper anodes will lead to sludge formation, which is very fine, difficult to filter and easy to bring roughness and pitting.)
5. It is better to use air agitate combining with cathode moving.
6. Cathode current density is 1-6 A/dm<sup>2</sup>; anodic current density should not be more than 2.5 A/dm<sup>2</sup>.
7. Generally, the voltage is 1-3V; large bath may use 6V. That depends on current density and the amount of plating articles.
8. Function and management of bath compositions and additives.

**Copper Sulphate:** is main source of copper ions. Excessive copper sulphate or low temperature will make crystalline deposits of copper sulphate on the anodes. That will increase resistance, decrease current and decrease the brightness and leveling in low Current density regions. Insufficient copper sulphate will cause burning in high Current density area and consume brighteners more than those in normal conditions.

**Sulfuric acid:** can increase the conductivity of bath. But excessive concentration will react with copper anode to make sulphate that can crystallize on the anode. High sulfuric acid also re-dissolves the plated copper. Hence pitting is observed on plated copper specially in the low current area.

**Chloride ion:** used as catalyst. It should be kept in the range of 50-100 ml/l. Insufficiency will lead to poor brightness in high current area and tree-like stripes; excess chloride will deteriorate brightness and leveling ability.

**CN-3000A:** low potential brightener, deficiency will cause poor brightness or leveling in low current area; excess will cause burning and even stripe in high current area. In case of excessive dose of CN-3000A, properly replenish CN-3000B to balance, or replenish 1-2 ml/l CN-3000C

**CN-3000B:** high potential brightener. Too much will cause non-bright and white haze in high potential, in this case, properly add CN-3000A to balance. Insufficiency will cause worse brightness and leveling.

**CN-3000C (MU):** used for making up bath. Add it only when adding copper sulphate usually. If the deposit appears pinholes or roughness, possibly CN-3000C is not enough. then replenish 1-2 ml/l of it.

Note: The specification is based on our company's experiment and this information is for reference only.

## Our Guarantee

Our guarantee extends to the continuous quality of our products as they leave our factory and not to their usage in the field. Our technical service will be pleased to answer any question you may have concerning operation and use of our products:

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