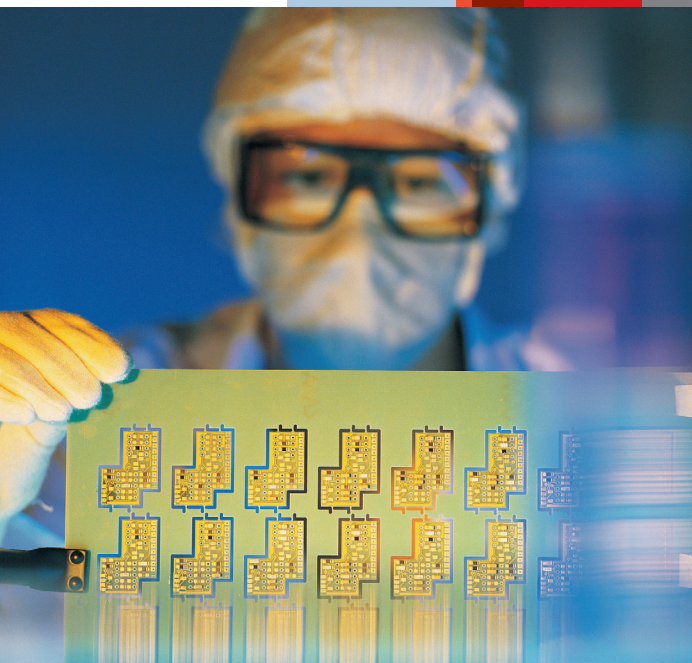


DuPont™ ZA™ Products

MICROETCHANTS FOR THE ELECTRONICS INDUSTRY

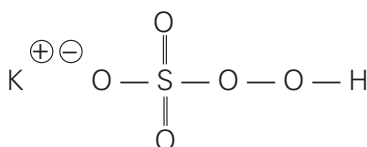


DuPont™ ZA™ Microetch Solutions are based on potassium monopersulfate (KMPS) chemistry which provides more efficient oxidation of copper due to its unique chemical structure. It gives better etched copper surface morphology with uniform distribution of well-defined grain structure compared to not-in-kind competitive products such as hydrogen peroxide/sulfuric acid (peroxide) and sodium persulfate (SPS). Optimized grain structure produced by ZA™ microetch solutions gives better adhesion for metal plating, dry film, final finishes, and IC packaging.

DuPont™ ZA100CL™ is the most economical microetch product for dry film surface preparation. DuPont™ Oxone® is the right choice for thin metal/organic film formation at final finish. ZA300HS™ offers the versatility of a liquid with controlled etch performance for thin copper layer shallow etch processing and fine pattern IC packaging.

DuPont™ ZA™ chemical microetchants that contain an acidic peracid as their active ingredient are used for copper cleaning and surface preparation in printed wiring board fabrication and wafer level packaging. ZA™ products provide the predictable and stable etch rate regulation that is needed to improve process control values as required for multi-step processing of thin foils, HDI, SAP processes, and WLP. DuPont products provide the high copper solubility and the ease of use needed in today's fast paced electronics fabrication environment.

Potassium Monopersulfate



Features and Benefits

- Liquids and free-flowing powders
- Uniform, predictable etch rate
- High etch rates
- Excellent bonding morphology
- Competitive cost structure

Physical and Chemical Description

ZA™ products contain a strong peroxygen oxidant with a high redox potential. Active oxygen content ranges from 1.0 to 5.0 wt%. This unique oxidative chemistry provides a selective, kinetically efficient and controlled oxidation of copper surfaces. The copper concentration in the working bath has no catalytic effect on active oxygen degradation.



The miracles of science™

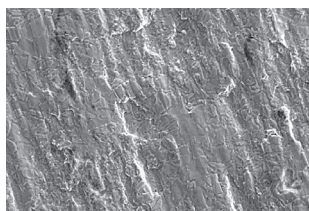
DuPont™ ZA™ Microetch Solutions

FEATURES

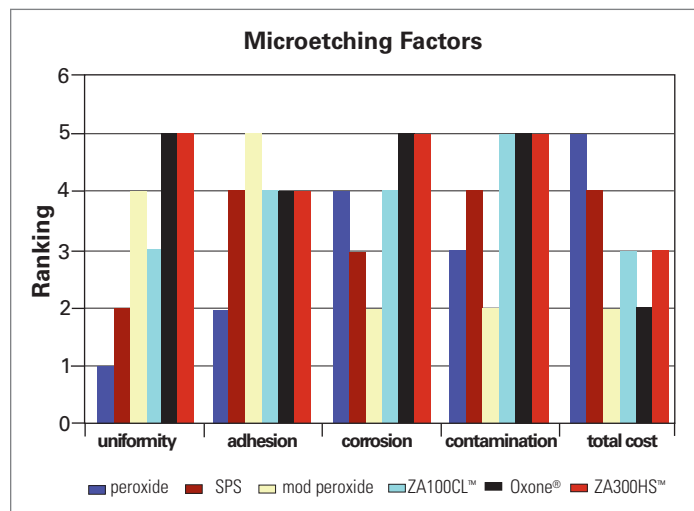
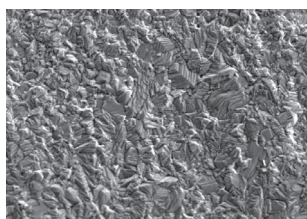
DuPont™ Oxone® based chemistry is the best solution to provide:

- Surface free of metal oxides
- Surface free of unwanted organic residues
- Best bonding surface for down stream applications

**Copper Laminate
Before Etching**



**After Etching with
ZA300HS™**



Product	Etch Quality	Application	Key Advantages
ZA100CL™	GOOD (optimum/uniform/well defined)	<ul style="list-style-type: none"> • Cu plating (PTH) • DFH lamination 	<ul style="list-style-type: none"> • Competitive price • Better morphology vs. SPS: (optimized adhesion; grain size uniformity) • Improved bath life vs. Oxone® (>25 g/l Cu loading) • No concern with potential contamination of plating chemistry baths. (e.g., organic additive residues)
Oxone®	BETTER (optimum/very uniform/well defined)	Final finish (ENIG/OSP/ immersion coatings)	<ul style="list-style-type: none"> • Very uniform/well defined surface morphology to fit thin metal/organic final finish process • No concern with potential contamination of plating chemistry baths. (e.g., organic additive residues)
ZA300™ ZA300HS™	BEST (optimum/vest uniform smooth)	<ul style="list-style-type: none"> • Final finish • Flash etch • Alloy formulation 	<ul style="list-style-type: none"> • Liquid microetch solution • Very uniform/well defined surface morphology to fit thin metal/organic final finish process • Available to provide controlled etch quality; shallow etch (low AO%) or fast etch (high AO%) • Ideal for formulated chemistries with alloy metal etch or multilayer etch • No concern with potential contamination of plating chemistry baths. (e.g., organic additive residues)

DuPont™ ZA™ Microetch Solutions

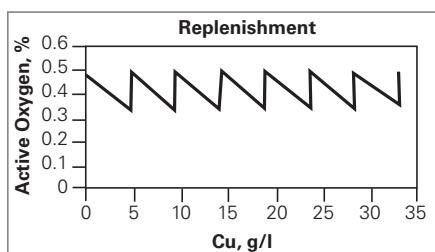
BENEFITS

DuPont™ ZA™ chemistries offer outstanding process control for a demanding Lean/Six Sigma environment. The electronic industries OEMs continue to demand improved quality at reduced costs. This can be achieved by tighter process control and lean manufacturing to reduce waste. DuPont potassium monopersulfate based chemistries offer patented and ideally formulated products that simplify your process control worries. DuPont products active material is not catalyzed by dissolved copper providing consistent etching rate performance.

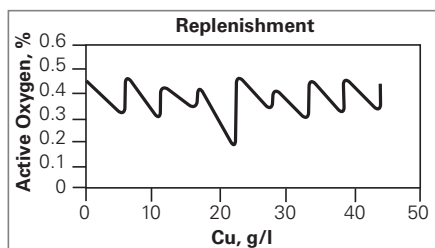
Operational Convenience

— Replenishment

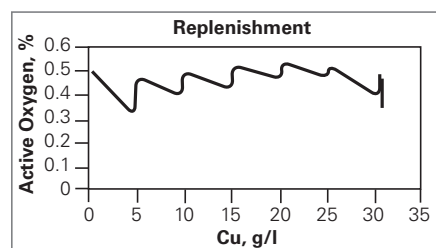
Oxone®/ZA™



Sodium Persulfate

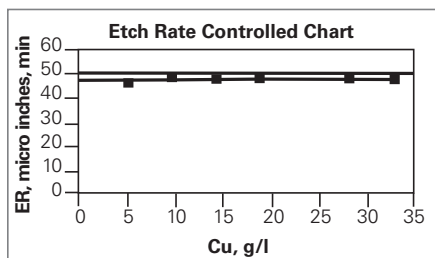


Hydrogen Peroxide

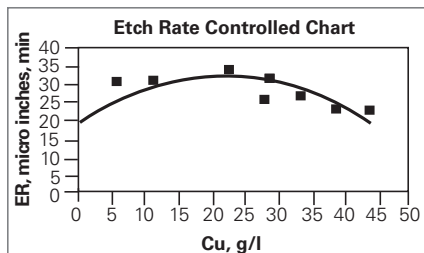


Bath Stability

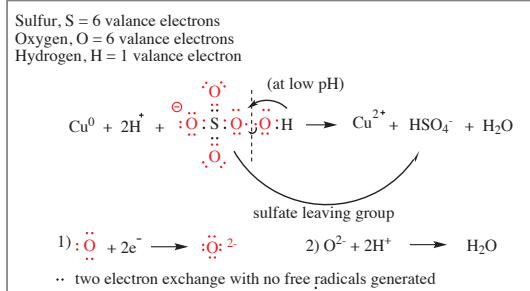
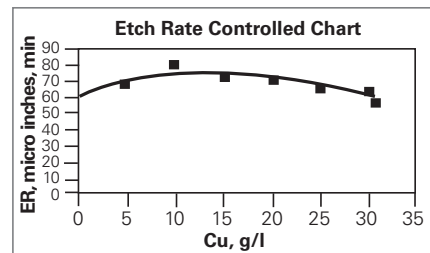
Oxone®/ZA™



Sodium Persulfate



Hydrogen Peroxide


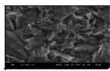

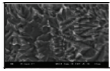

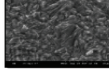

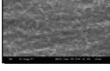

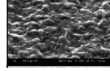

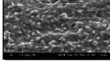


DuPont potassium monopersulfate chemistry provides heterolytic kinetics that follow a simple two electron exchange. This simple reaction mechanism offers advantage over hydrogen peroxide and sodium persulfate in which the peroxide linkage can be catalyzed by dissolved copper to split in homolytic fashion forming free radicals. Free radical reactions have much more inconstant rates of reaction that result in a changing or less predictable etch rate over the bath life.

DuPont™ ZA™ Microetch Solutions

Microetching products by DuPont offer a range of performance characteristics to meet every situation and cost structure. The table below can be used to help you assess which product best fits your application.

DuPont™ Oxone® and ZA™ products are a good choice over hydrogen peroxide and sodium persulfate due to their ability to remove metal oxides and organic residues while creating an ideal bonding morphology.

Product	Etch Quality (grain boundary: size/distribution/shape)	Typical Surface Morphology	Target Application	Value
Peroxide	Poor (large/nonuniform/blunt)	 	DFM, lamination, Cu plating	Inexpensive
SPS	Poor (small/less uniform/sharp)	 	DFM, lamination, Cu plating, final finish	Competitive price; no concern on potential contamination of plating (organic additive residue)
Modified Peroxide	OK (small/uniform/high Ra)	 	DFM, lamination, Cu plating, final finish, PSR	Strong adhesion; uniform surface morphology; controlled morphology with different modifier chemistry
ZA100CL™	Good (optimum/uniform/well defined)	 	Cu plating (PTH), DFM lamination	Competitive price; better morphology vs. SPS: (optimized adhesion; grain size uniformity); improved bath life vs. Oxone® (>25 g/L Cu loading); no concern on potential contamination of plating (organic additive residue)
Oxone®	Better (optimum/very uniform/well defined)	 	Final finish (ENIG, Imm Ag., OSP)	Very uniform/well defined surface morphology to fit thin metal/organic final finish process; no concern on potential contamination of plating (organic additive residue)
ZA300HS™	Best (optimum/best uniform/smooth)	 	Final finish, flash etch, alloy formulation	Liquid microetch solution; very uniform/well defined surface morphology to fit thin metal/organic final finish process; available to provide controlled etch quality; shallow etch (low AO%) or fast etch (high AO%); fit to formulation chemistry for alloy metal etch or multilayer etch; no common potential contamination of plating (organic additive residue)

For further information, please visit our website at www.oxone.dupont.com

To speak with a Customer Service Representative, call
1-888-243-4608 North America, 302-892-7536 International

For medical emergencies call 1-800-441-3637 within the United States.
For those outside of the United States, call 302-774-1139

For transportation emergencies call 1-800-424-9300 within the United States.
For those outside of the United States, call 703-527-3887



The miracles of science™

Copyright © 2008 DuPont. All rights reserved. The DuPont Oval Logo, DuPont™, The miracles of science™, ZA™, ZA100 CL™, ZA300HS™, ZA300™, and Oxone® are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates.

The information set forth herein is furnished free of charge and based on technical data that DuPont believes to be reliable. It is intended for use by persons having technical skill, at their own risk. DuPont makes no warranties, expressed or implied, and assumes no liability in connection with any use of this information. Nothing herein is to be taken as license of operation under or a recommendation to infringe any patents.

K-20104 (10/08) Printed in the U.S.A.