DuPont EKC Technology

Cu Integration Solutions

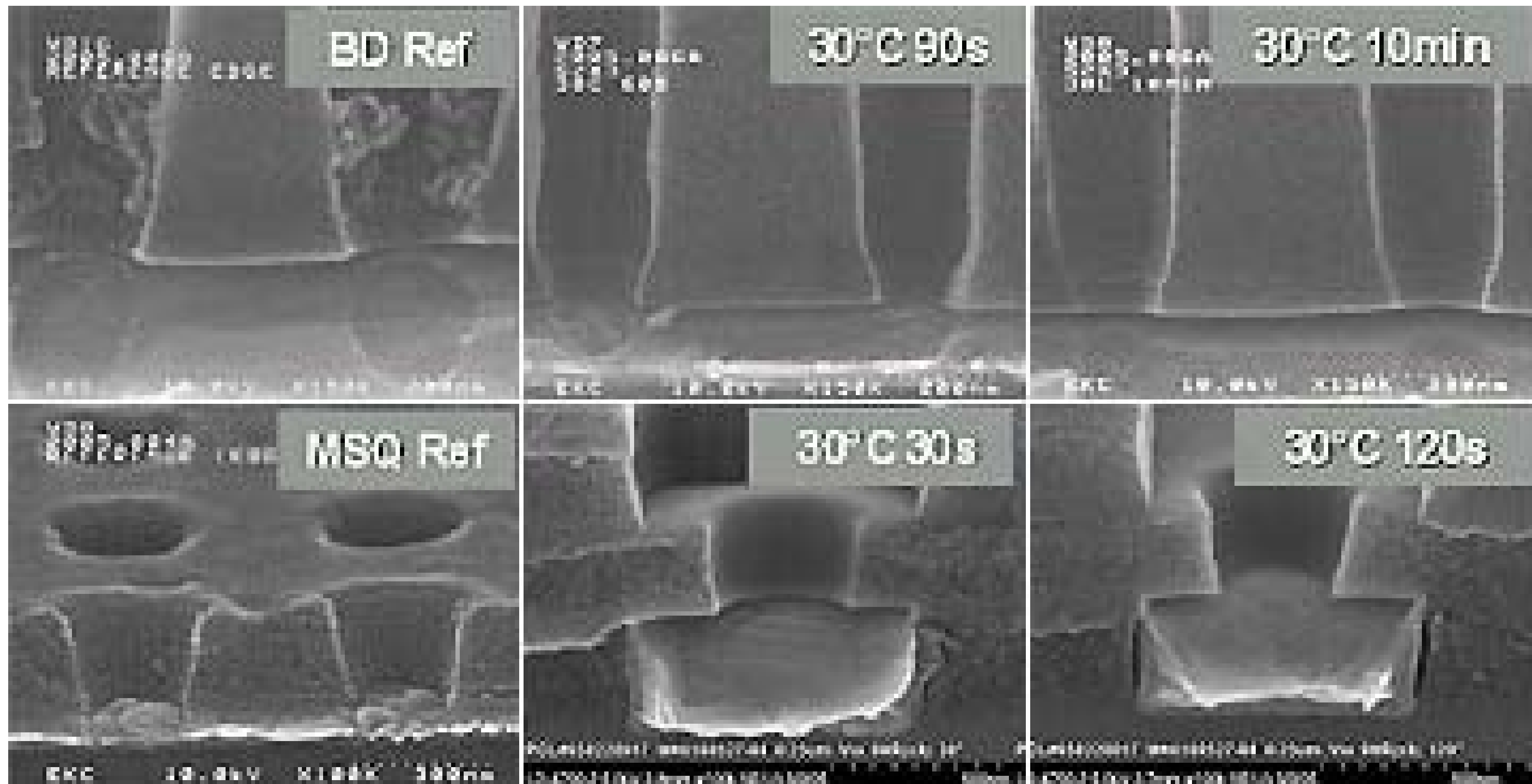
Cu Integration Solutions

CuSolve™ EKC520™ has been designed to address the challenges of removing post etch residues formed at BEOL Cu integration. EKC520™ is qualified for production at 130 and 110nm, is under qualification for 90nm and successfully evaluated at 65 and 45nm.

EKC520™ is an optimised formulation designed to meet the Voice of the Customer needs for current and future Cu cleaning challenges extending to and enabling future technology nodes.

The components in EKC520™ have been optimised to selectively convert insoluble post etch residues into derivatives that are rapidly removed by dissolution in water, without CD loss, Cu corrosion or increase dielectric permittivity.

DUPONT®



EKC520™ has been optimised to give the highest possible selectivity to PER as possible. As such EKC520™ can be extended to batch process applications.

Cleaning Mechanism

Post Etch Residue

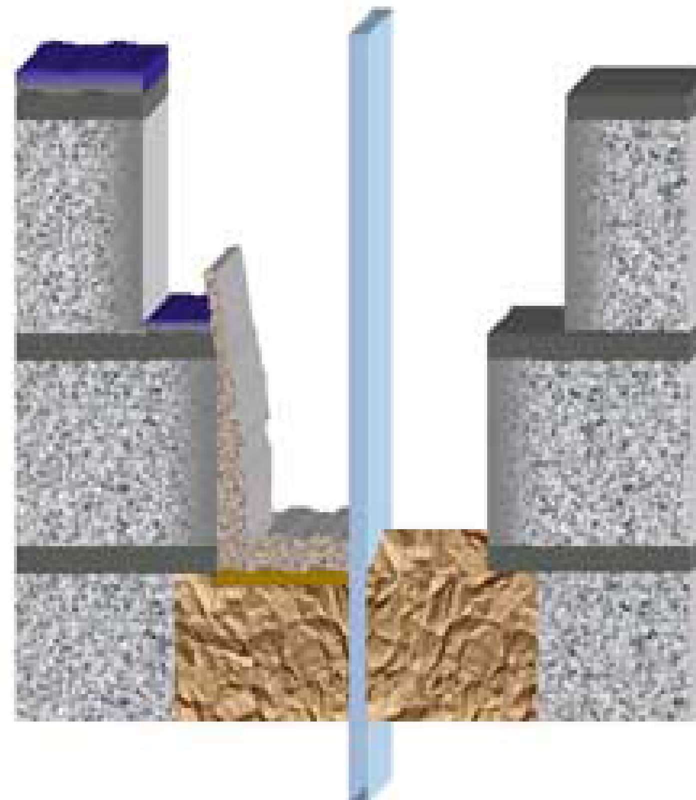
C_xF_y Deposition

Plasma "Damage" Dielectric

Cu Contamination

$Cu_{(x)}O$

PR/BARC Ash Residue



Compatibility

No Trapped Solvent

No Change in K or CD

No Pitting or Undercut

Cleaning

All PER Removed

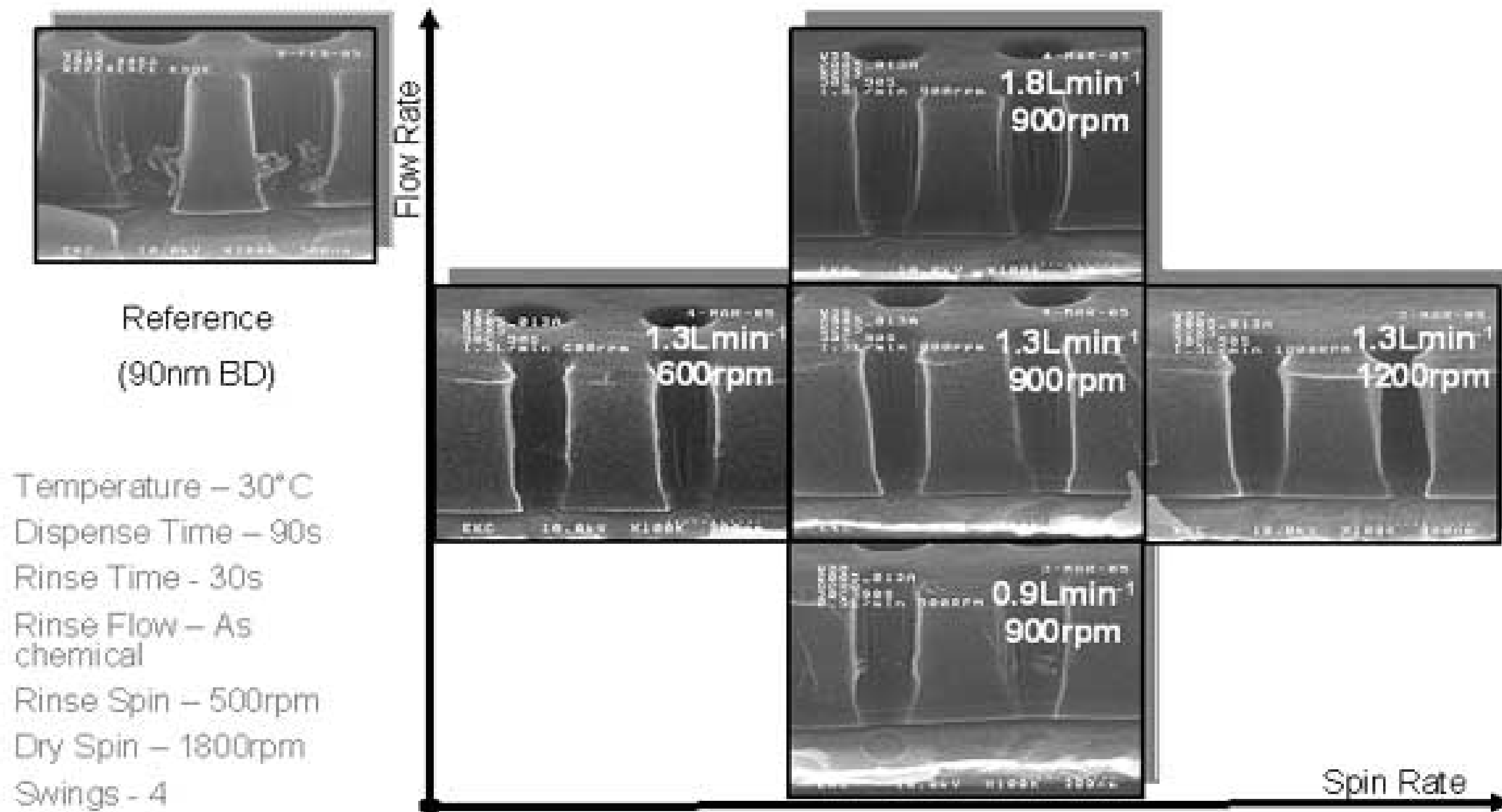
No $Cu_{(x)}O$

Pre-Clean

Post-Clean With CuSolve™ EKC520™

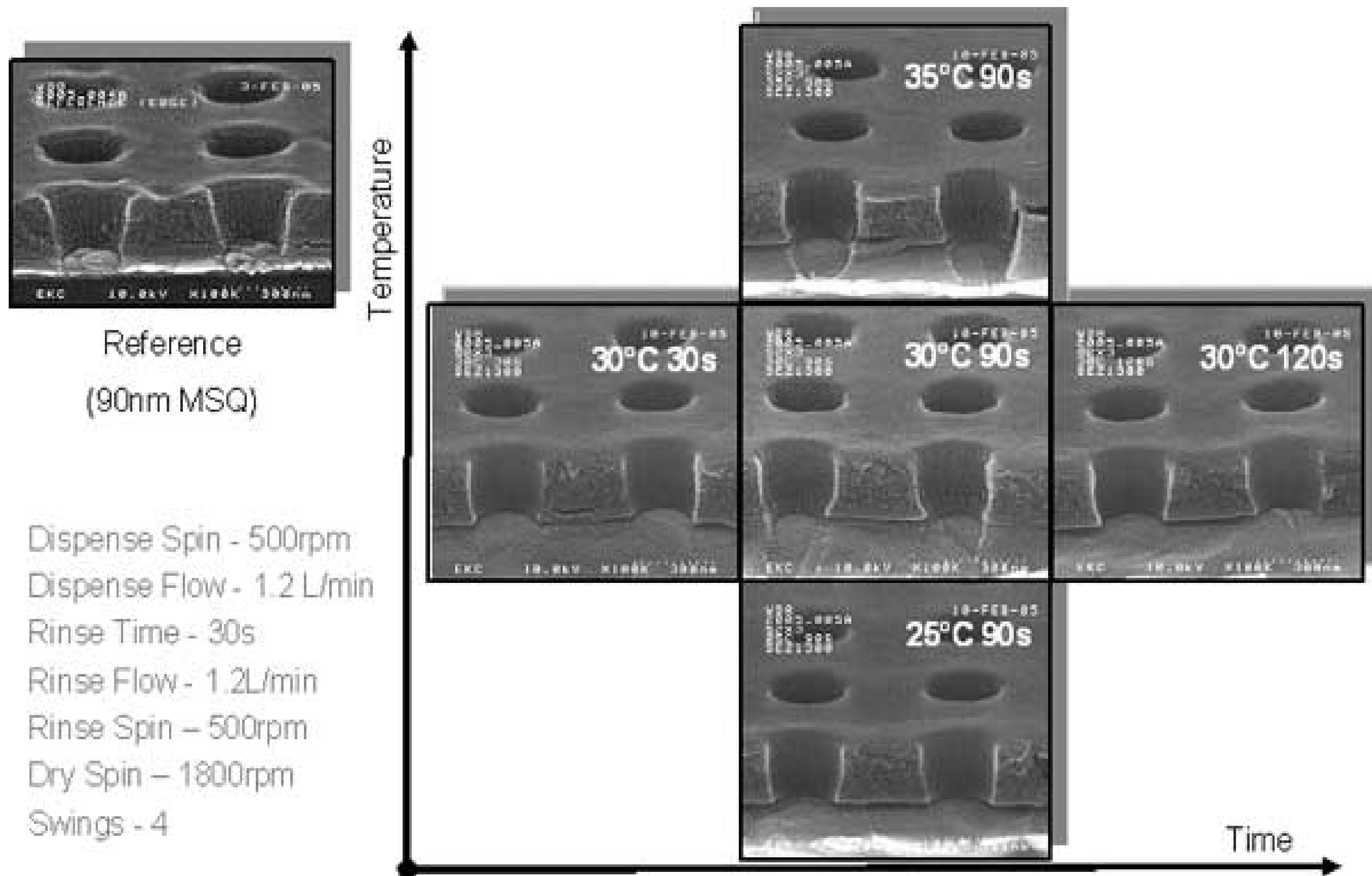
DUPONT®

Proven Single Wafer Process



EKC520™ was developed for use on single wafer platforms. The product has been extensively tested on to characterise the cleaning performance. Here the cleaning of a Black Diamond device is shown and the flow and chuck spin rates optimised.

DUPONT®



MSQ is one of the most sensitive dielectric materials available. Here results are shown for EKC520™ cleaning a MSQ device in 30s without any CD loss at 120s.

A Sustainable Solution

CuSolve™ EKC520™ is a highly aqueous, non hazardous and genuinely sustainable solution to industry needs.

- Highly Aqueous
- Low Viscosity
- Non-Flammable
- Non-Hazardous
- No Point of use mixing
- No Intermediate rinse
- No DMAc/NMP
- Non-Corrosive
- No Peroxide

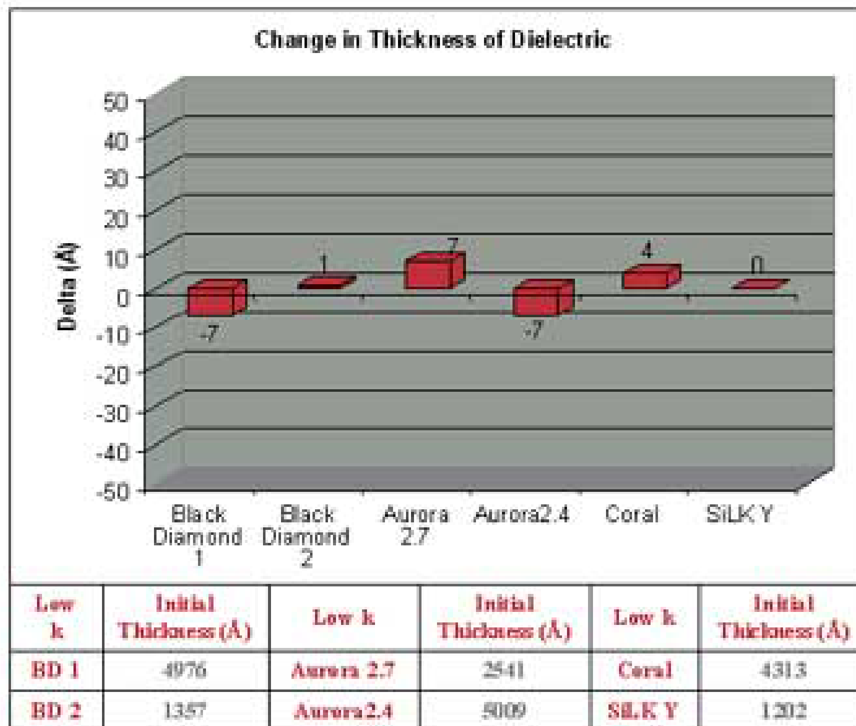
Physical Properties

Property	EKC520™
Cu Loss (Å)	18
TEOS Loss (Å)	9
$Cu_{(x)}O$ Removal (s)	3
pH	2.0
Surface Tension (mN/m)	61.0
Viscosity (mPaS)	1.026
Boiling Point (°C)	100
Freezing Point (°C)	1
Flash Point (°C)	>110

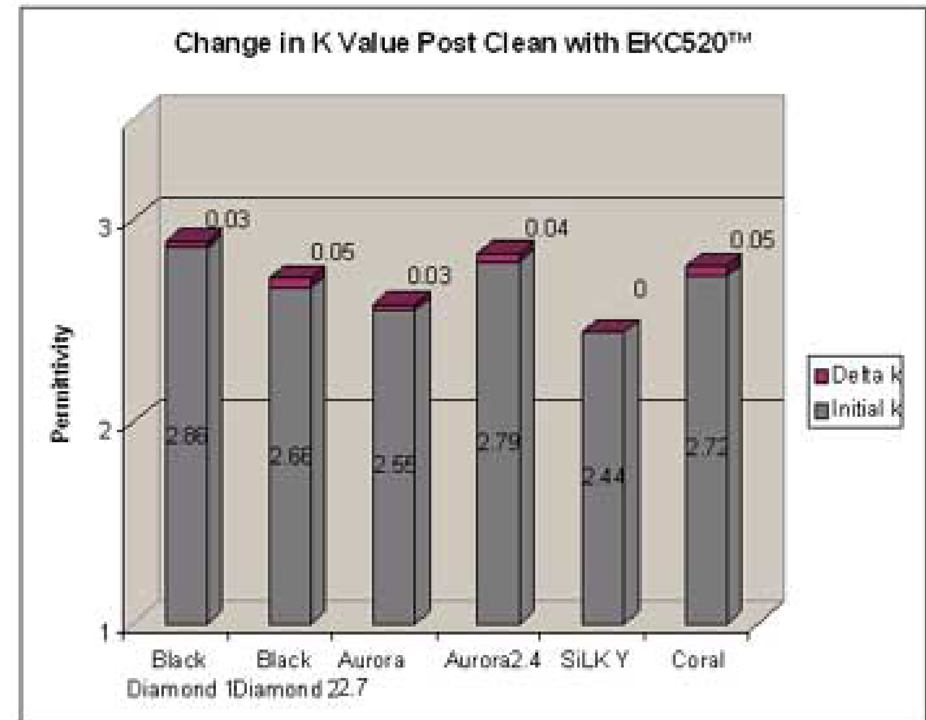
Material Loss quoted as total loss in 10minutes at 25°C

DUPONT

Dielectric Compatibility



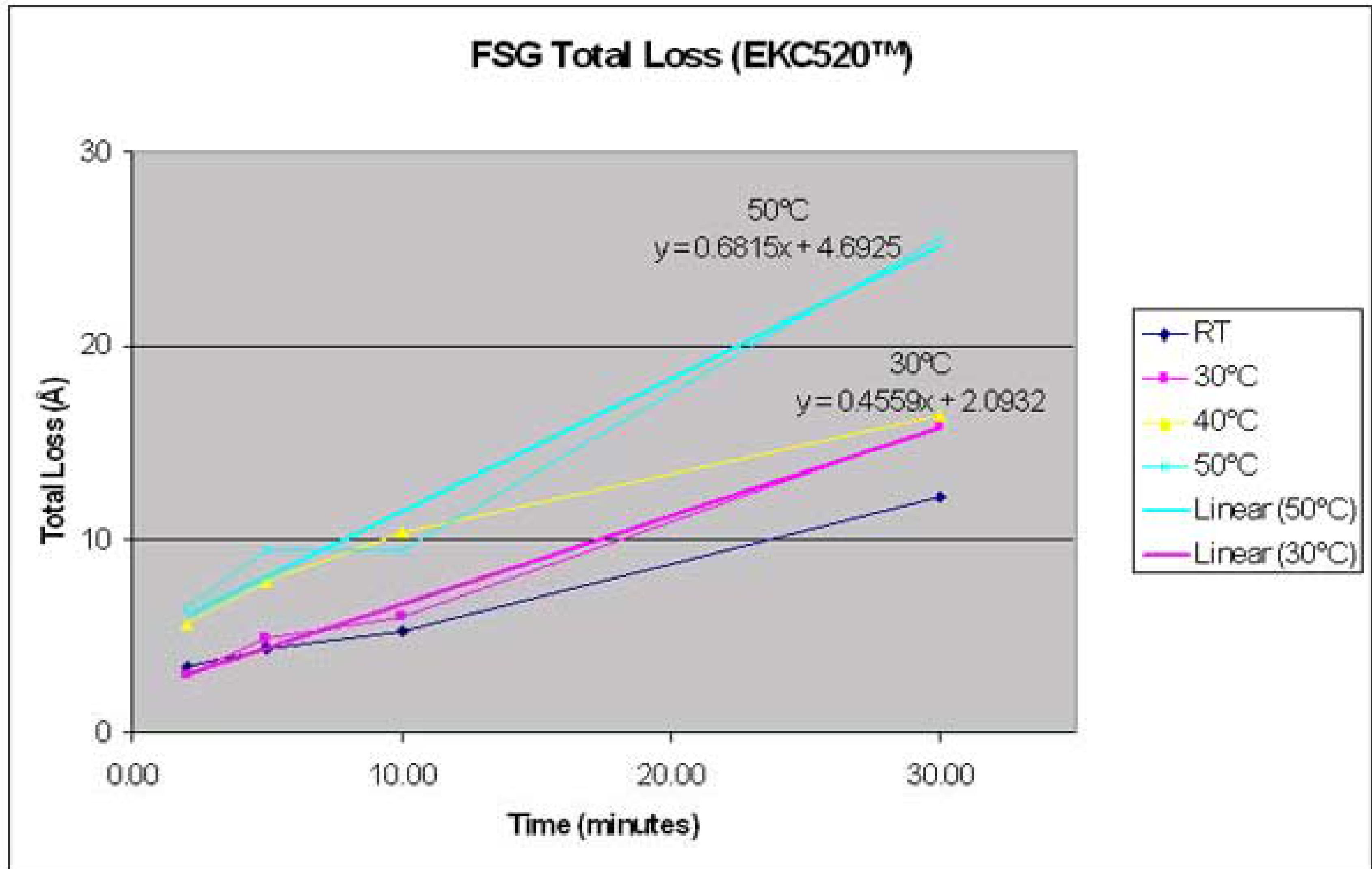
Low k	Initial Thickness (Å)	Low k	Initial Thickness (Å)	Low k	Initial Thickness (Å)
BD 1	4976	Aurora 2.7	2541	Coral	4313
BD 2	1357	Aurora2.4	5009	SiLK Y	1202



This figure shows the initial thickness of a series of Low k dielectrics and the change in that thickness measured after immersion in EKC520™ for 10minutes at 25°C

The shift in permittivity for several Low k materials was measured at 25°C over 10 minutes immersion in EKC520™. Even for porous Low k dielectrics there was minimal change in the measured k value.

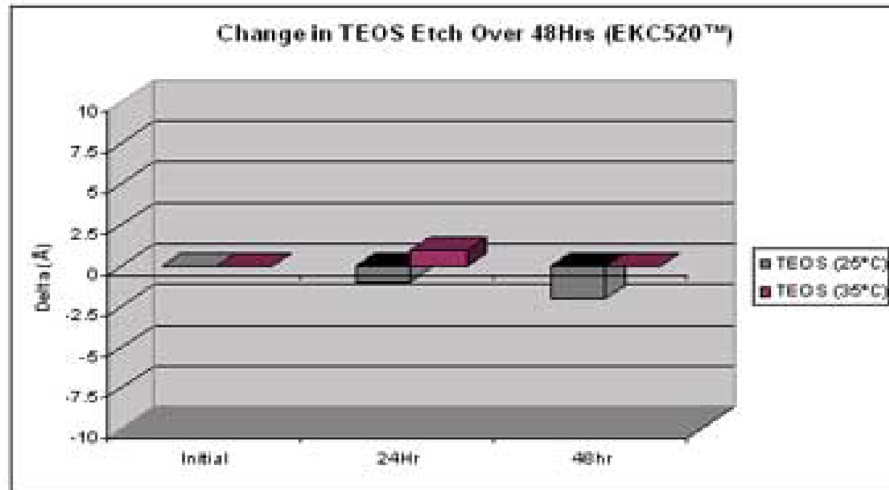
DUPONT®

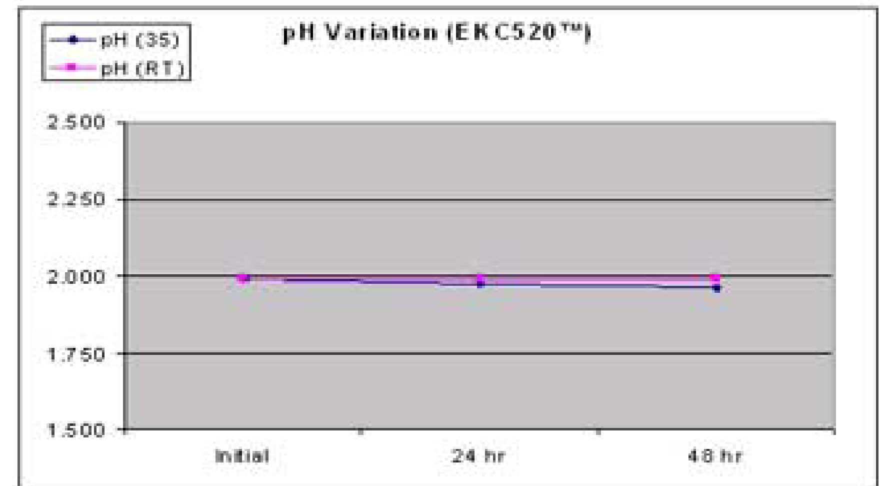


Very low etch rates were observed for EKC520™ on FSG films. Even at elevated temperatures of up to 50°C the observed etch rate was less than 1Å/min.

DUPONT

Stable Process





The bathlife of EKC520™ in an open, extracted environment (worst case) was at least 48 hours at 25 or 35°C. No variation in TEOS etch rate was observed.

No variation in pH was observed over a 48 hour test in an open and extracted environment. This shows the inherent stability of EKC520™.

DUPONT

Summary

- CuSolve™ EKC520™ is a truly safe, aqueous and sustainable solution to current and future industry needs for removing post etch residues from sensitive leading edge Cu and Low k devices.
- CuSolve™ EKC520™ has been designed for maximum selectivity to rapidly remove post etch residues without loss of CD, Cu corrosion, change in permittivity or addition of particulate or trace metallic contamination.
- CuSolve™ EKC520™ is a robust, highly optimised chemistry with a broad process window and exceptional stability.
- CuSolve™ EKC520™ is a proven and qualified product.

DUPONT
The miracles of science™