Diversified Applications Engineering Technologies

For further information concerning the following topic,
please contact John Moore.

Phone: (805) 484-5546
E-mail: info@daetec.com

www.daetec.com

A Novel Approach to Gold Impregnated Polymer Removal Using Solvent Based Chemistry

CS-MAX Monterey, CA

Alexander Smith[a] John Moore[a] Chad Becker[b]
General Chemical Corp., Freescale Semiconductor

Outline

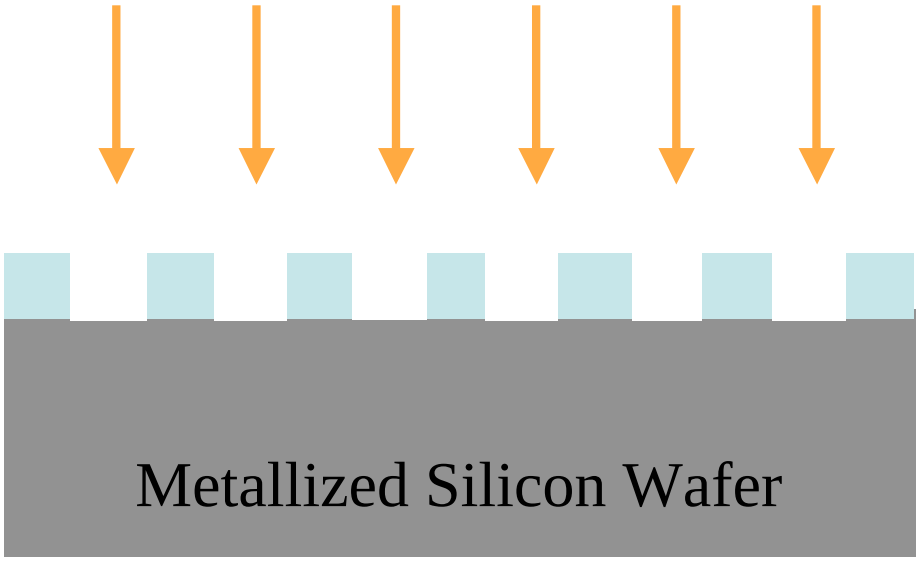
Etch Residue Formation

Characterization

Metal Coated Residue Removal

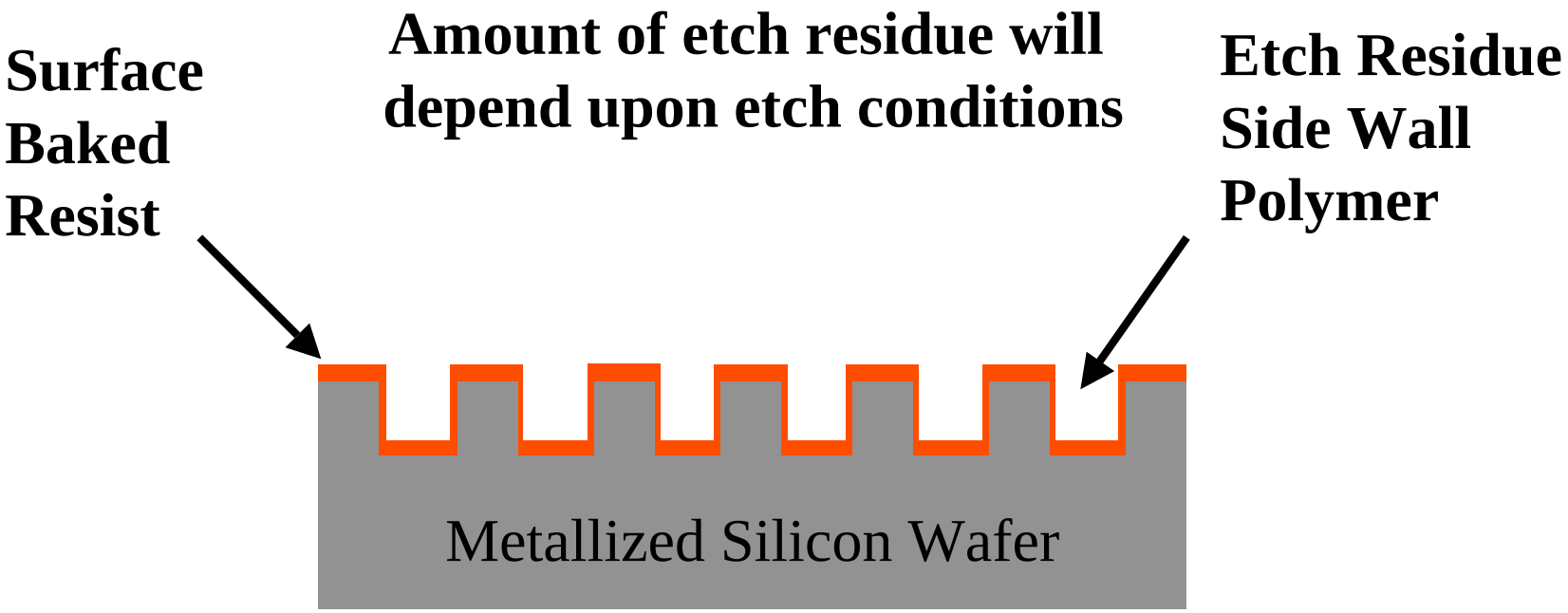
Summary

Resist Patterning



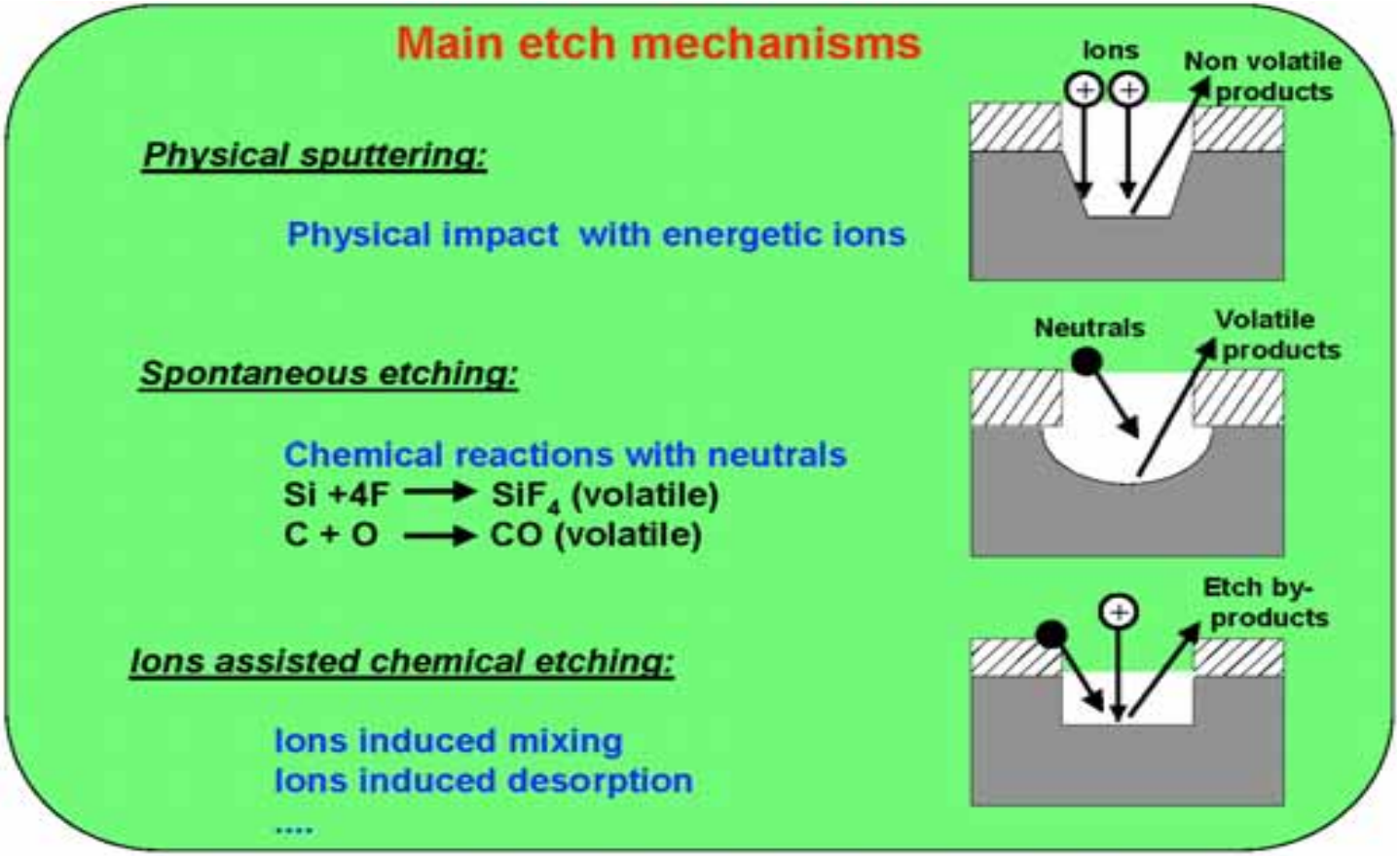
Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Etch Residue Formation



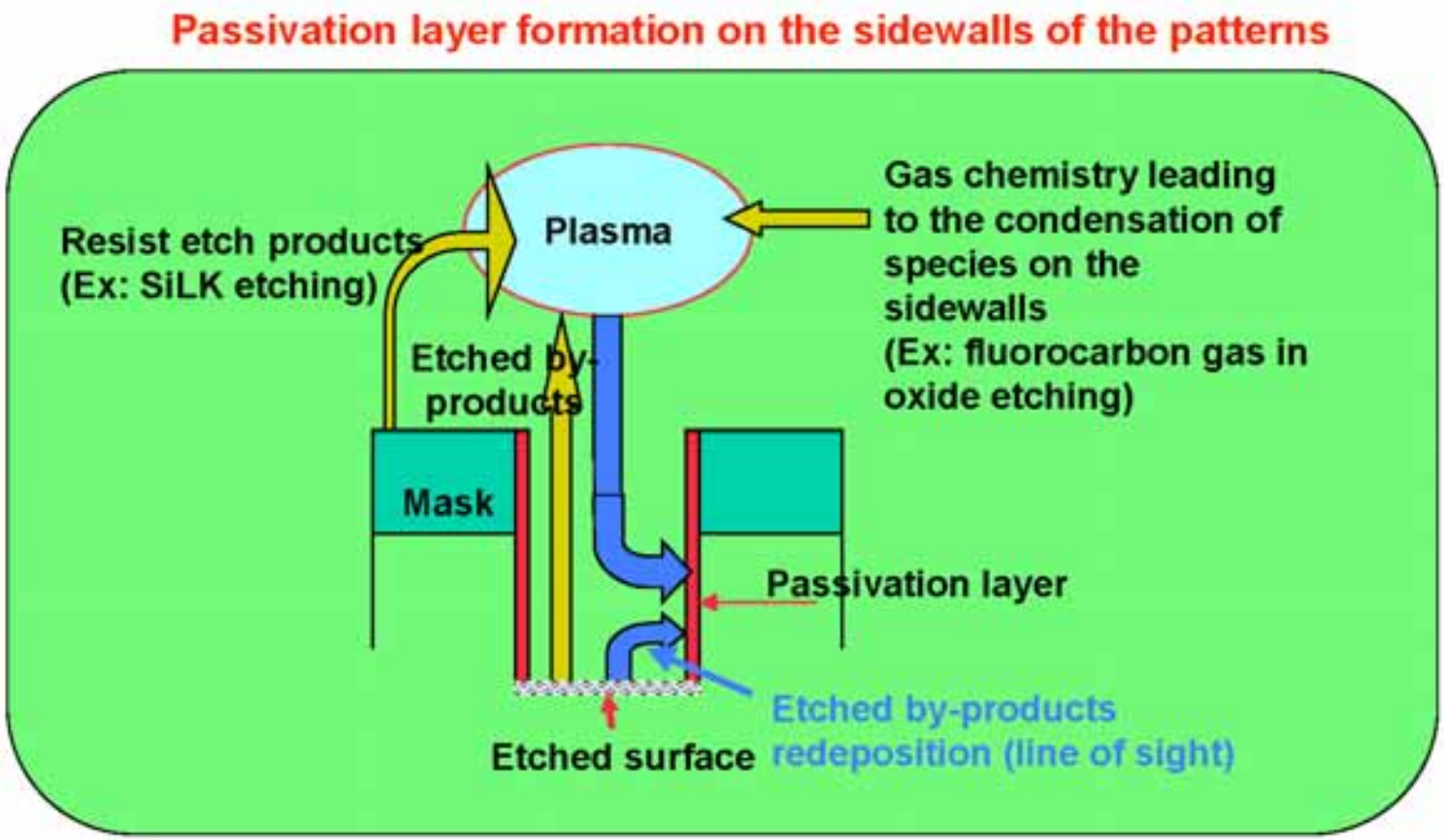
Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Plasma Etch Fundamentals



Courtesy: Chevolleau, T., LTM/CNRS, IITC 2003

Plasma Etch Fundamentals



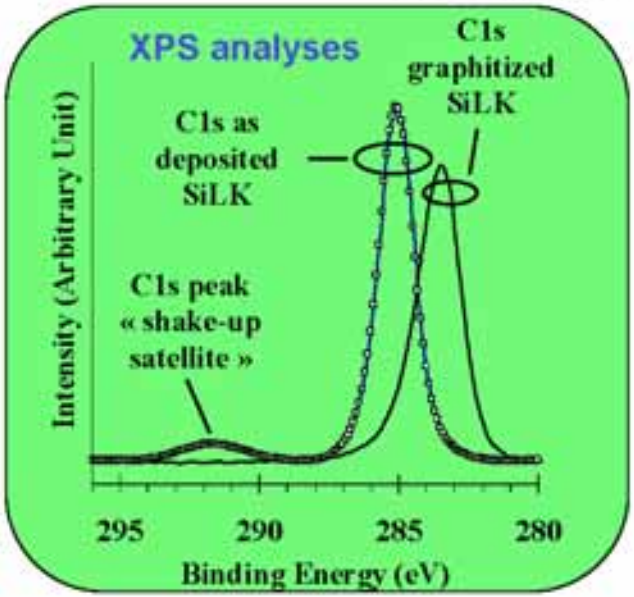
Courtesy: Chevolleau, T., LTM/CNRS, IITC 2003

Etch Anisotropy on Dielectric

Graphitization phenomenon

Hydrogen components are sptuttered away by ion bombardment

Carbon skeleton of the SiLK



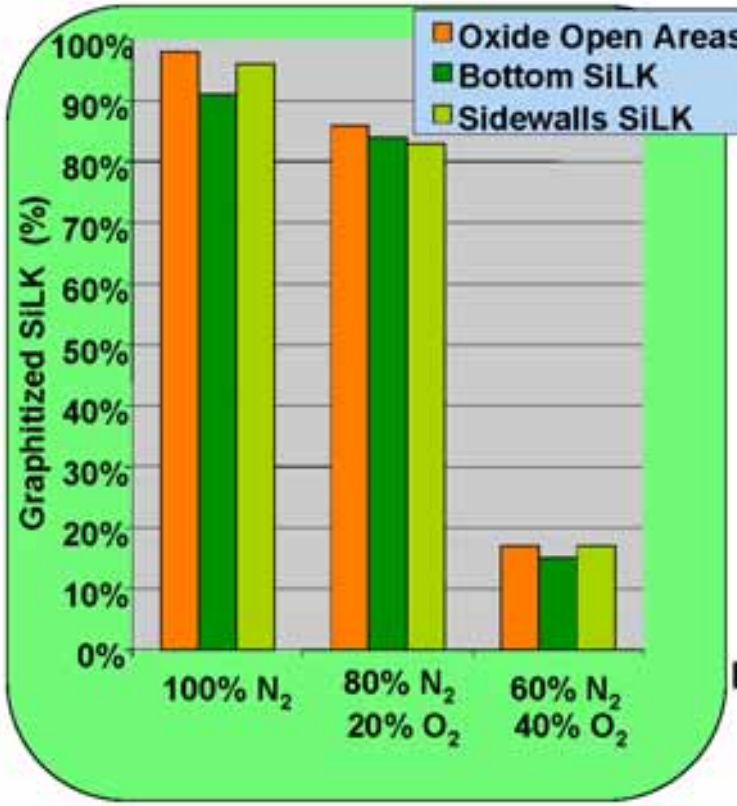
Physical etching conditions (Ar plasma)

Shift of C1s SiLK™ from 285 eV (as deposited) to 283,5 eV (graphite signature)

Courtesy: Chevolleau, T., LTM/CNRS, IITC 2003

Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Etch Anisotropy on Dielectric



Graphitization conditions

(oxygen deficient plasma)

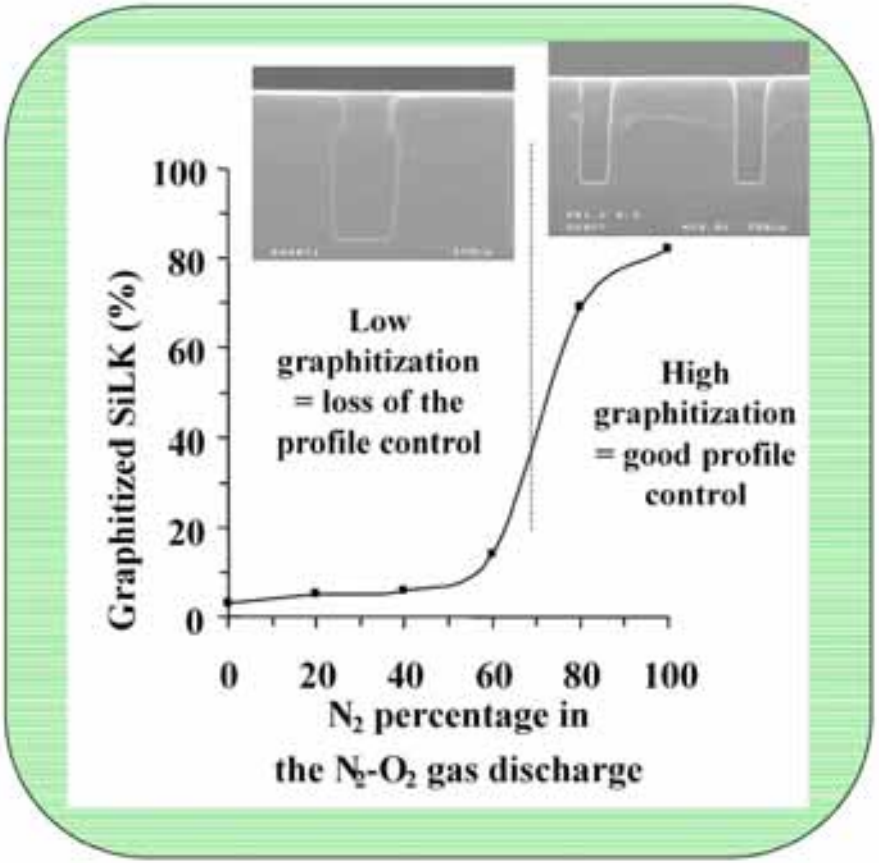
Graphitized SiLK on :

- sidewalls
- oxide open areas

Deposition of carbon by-products from the gas phase

Courtesy: Chevolleau, T., LTM/CNRS, IITC 2003

Etch Anisotropy on Dielectric



Sidewall Graphitization

better profile control

(no lateral etching)

Courtesy: Chevolleau, T., LTM/CNRS, IITC 2003

Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Au Etch Residue Removal

Applications for GenSolve™ 525-D

- III-V Compound Semiconductor
- Frontside Via Etch through Organic Layer (Polyimide or BCB)
- Backside Via Etch through Substrate to Gold Contact
- Rework

Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Au Etch Residue Removal

Conventional Process

* Mineral Acid Immersion with KI
* DI Rinse + SRD
* Resist Strip in Specialty Chemistry
* DI Rinse + SRD

- - - Depending upon nature of resist, additional immersion steps may be required...

Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Etch Rate

GenSolve™ 525-D

Au Removal:

20-60 Å/min

(depends upon GenSolve 525-D choice)

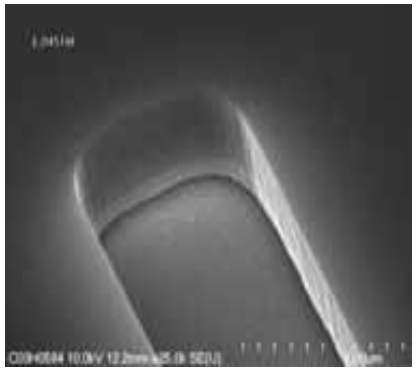
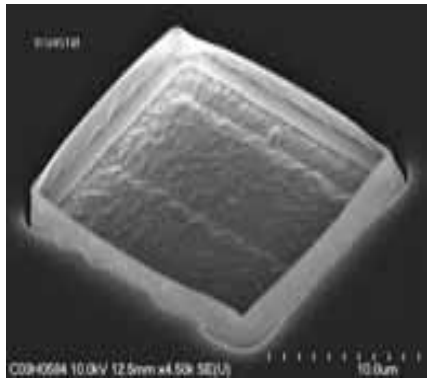
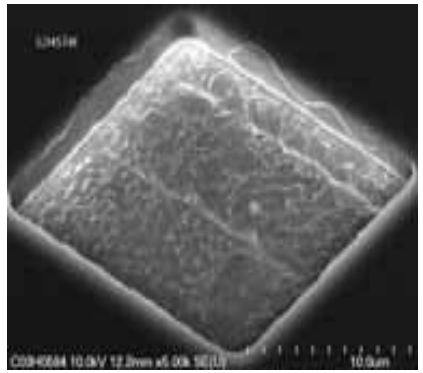
100Å removed

(60-70C, 1-2min)

Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Au Etch Residue Removal

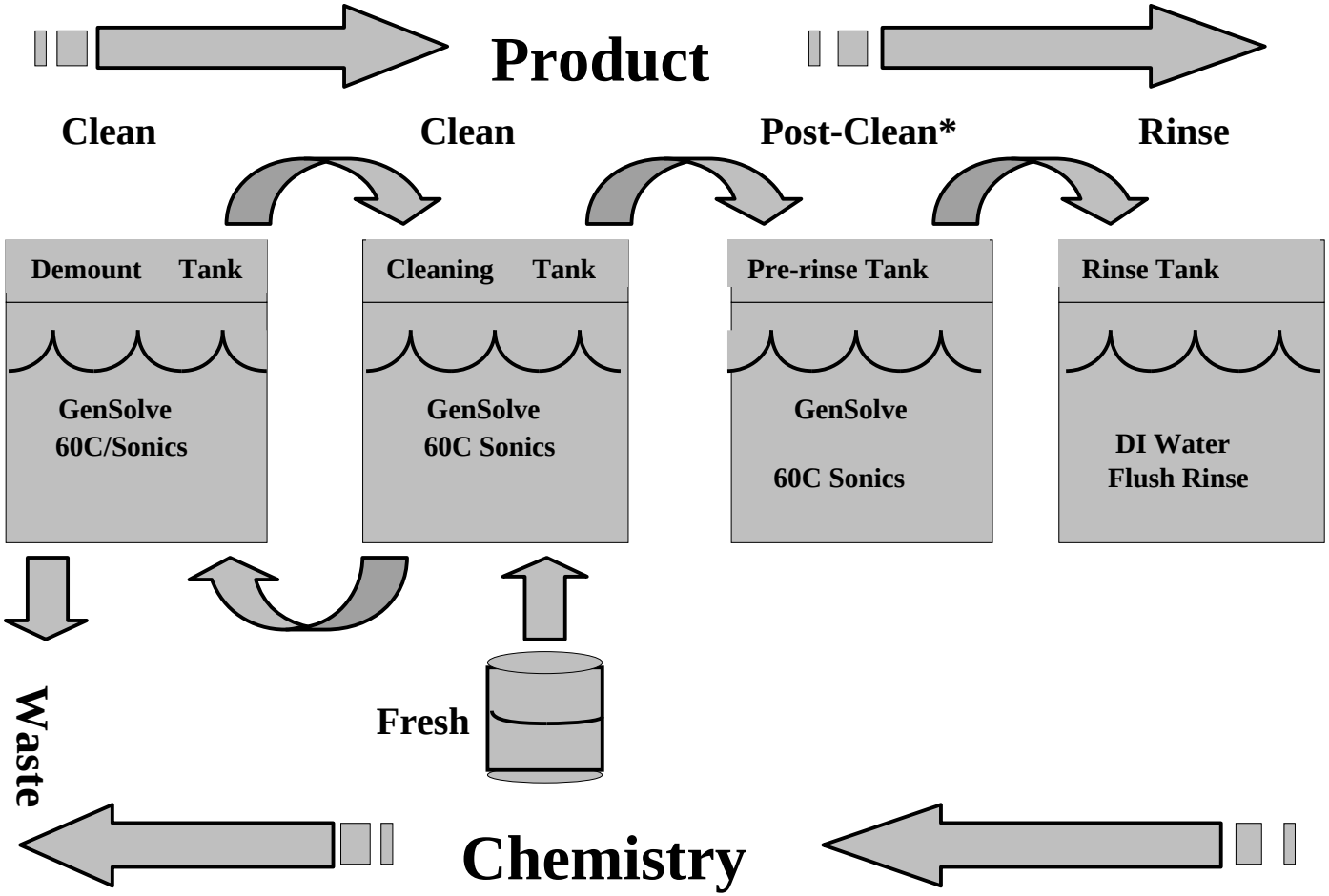
GenSolve™ 525-D (Batch Wafer Immersion Clean)

	Reference	Cleaned
Sputtered Au		
Plated Au		

Process Recommendation: GenSolve™ 525-D, 60-70C, 2 minutes, DI Rinse

Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Clean and Recirc Process



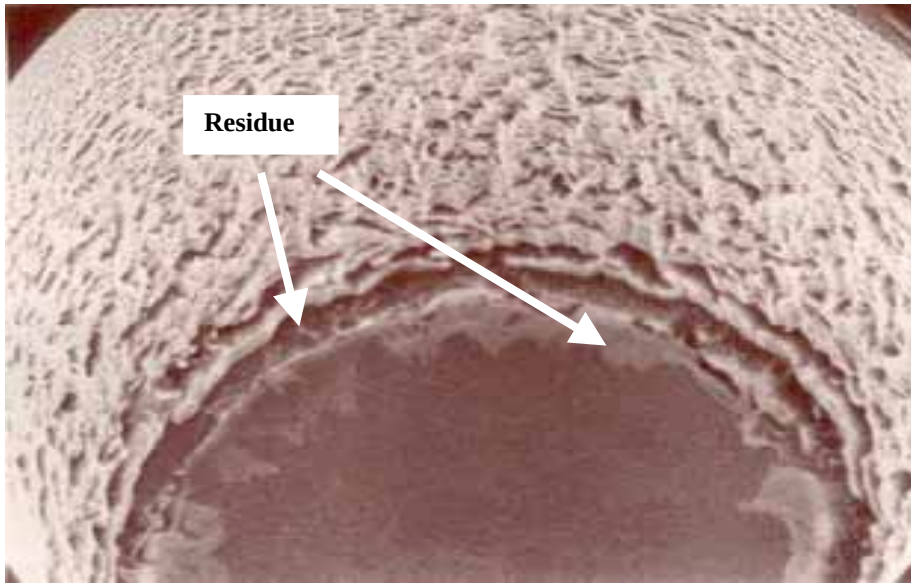
Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Au Etch Residue Removal

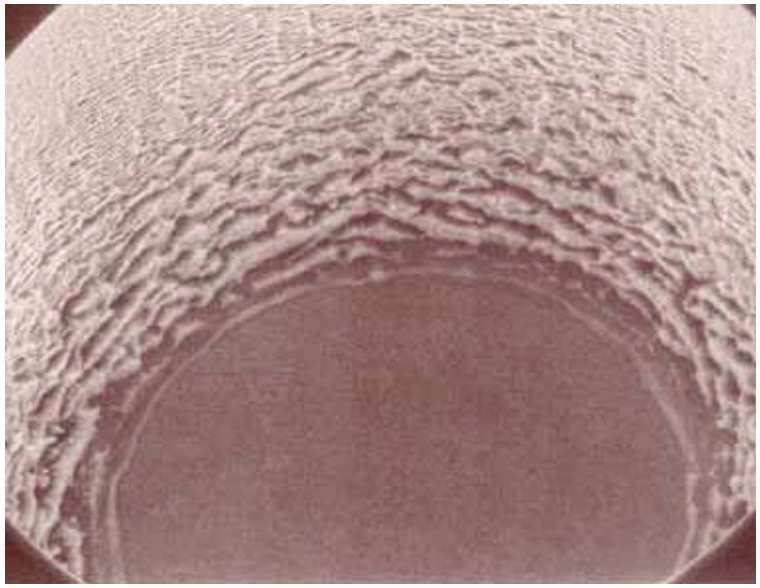
GenSolve™ 525-D (Single Wafer Tool Clean)

Backside Via Cleaning - 90s, single wafer tool

Reference



Cleaned

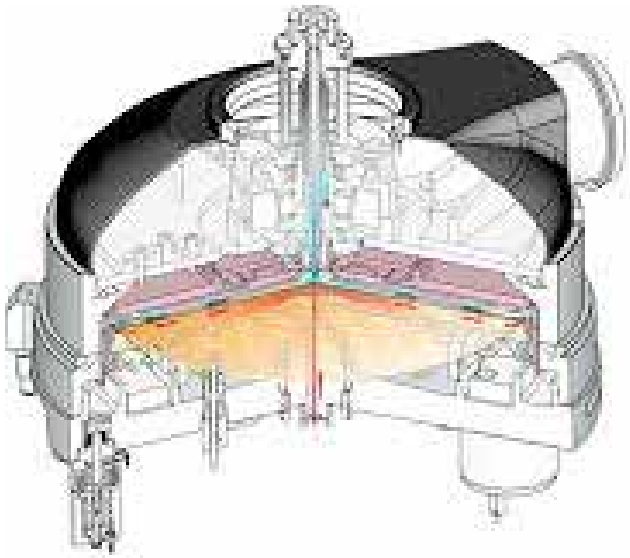


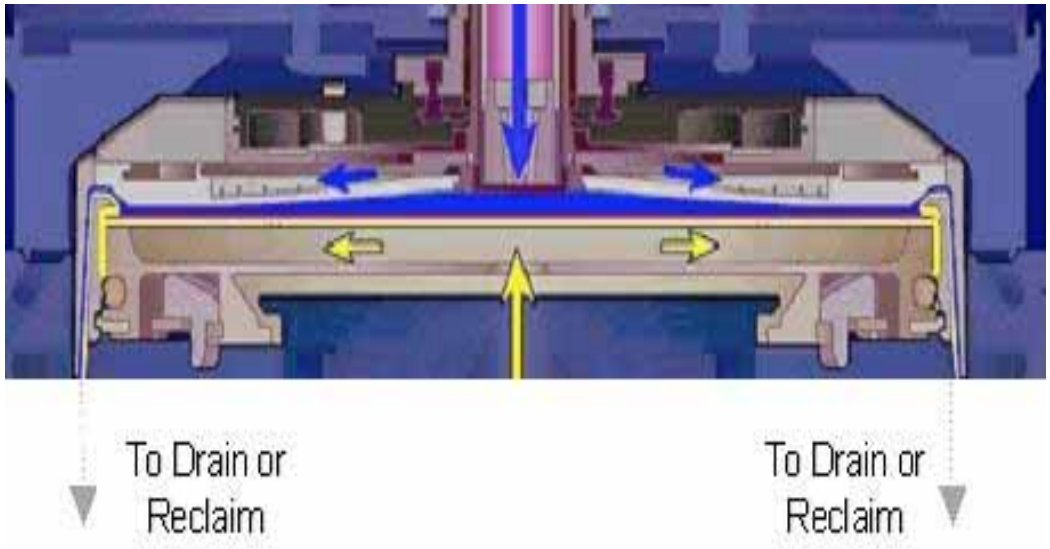
Contact DAETEC for more information
(805) 484-5546, www.daetec.com

Au Etch Residue Removal

GenSolve™ 525-D

Semitool Capsule™ Single-Wafer Tool





Solvent Cleaner -
GenSolve™ 525-D
60C Strip + DI, 45-90sec Cycle

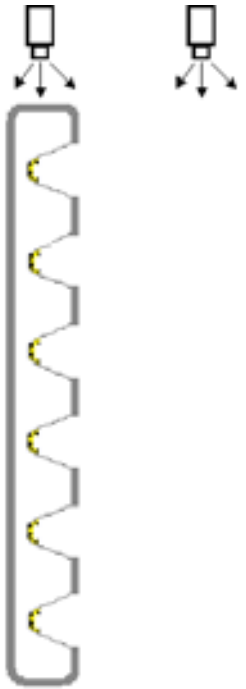
Throughput
> 150 wph

Contact DAETEC for more information
(805) 484-5546, www.daetec.com

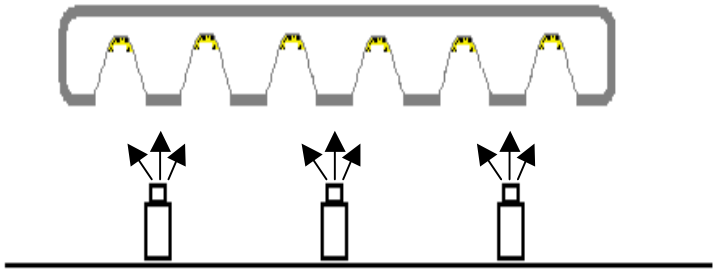
Au Etch Residue Removal

GenSolve™ 525-D (Single Wafer Tool Clean)

Conventional Batch Tool

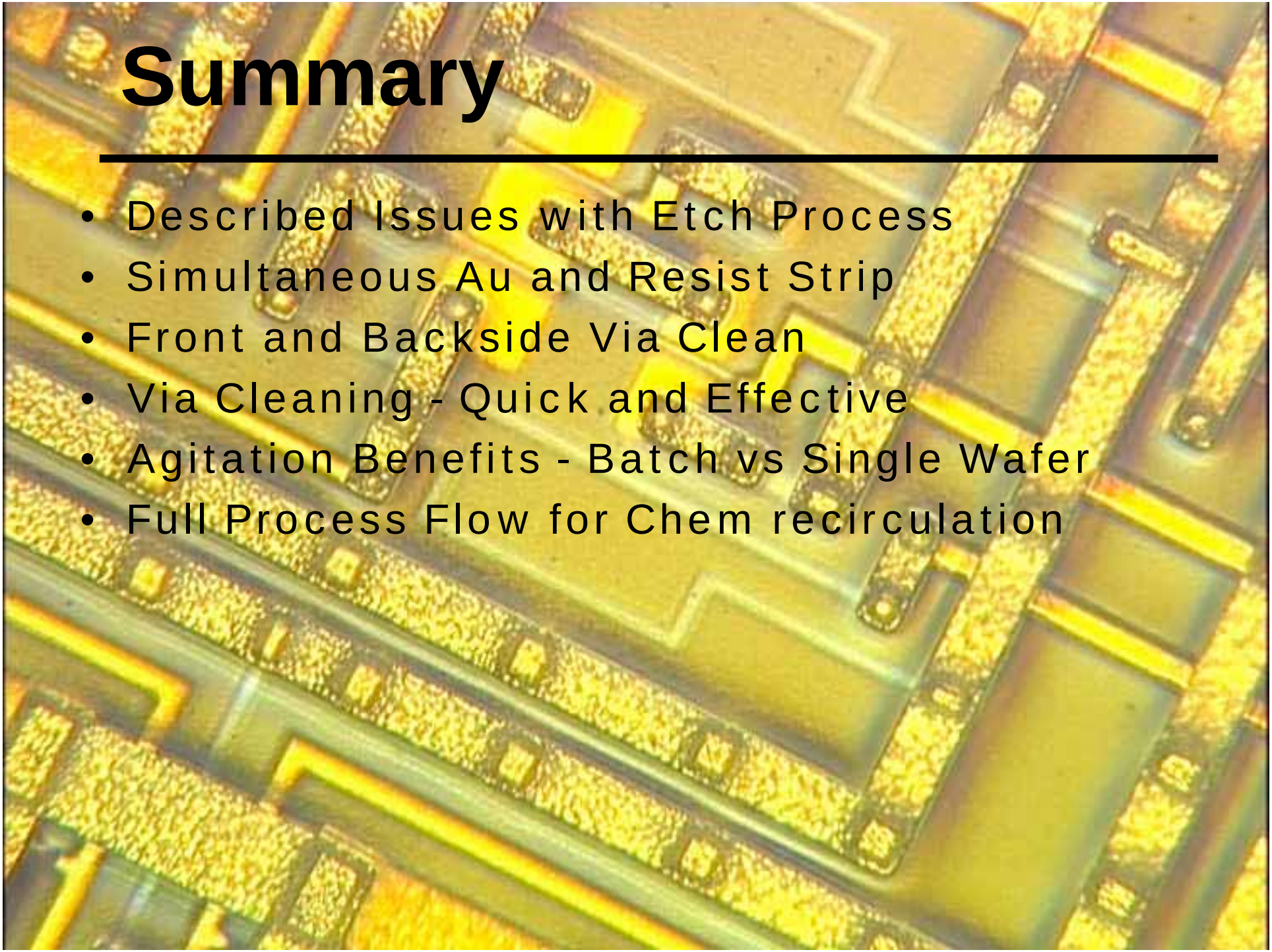


Single Wafer Spray



Both tools - Chemical Recirculation is Recommended

Contact DAETEC for more information
(805) 484-5546, www.daetec.com



Summary

- Described Issues with Etch Process
- Simultaneous Au and Resist Strip
- Front and Backside Via Clean
- Via Cleaning - Quick and Effective
- Agitation Benefits - Batch vs Single Wafer
- Full Process Flow for Chem recirculation