

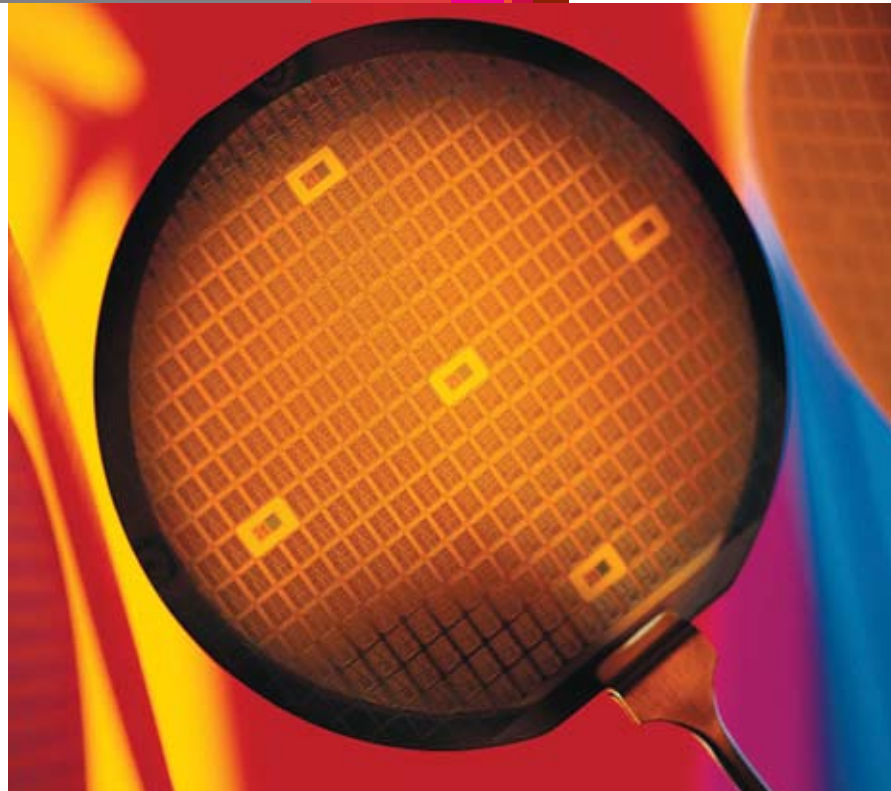
# DuPont Semiconductor Fabrication Materials

INNOVATIVE SOLUTIONS, ADVANCED THINKING

## PUTTING SCIENCE TO WORK

It's safe to say semiconductor materials weren't on the minds of the DuPont founders back in 1802. Yet their commitment to science laid the foundation for what would become one of the broadest portfolios of innovative materials and advanced process expertise available to semiconductor manufacturers, as well as equipment, materials and component suppliers. More than 200 years later, "The Miracles of Science" is much more than just our corporate motto — it's a way of life and an ongoing quest for discovery.

As a leading supplier of semiconductor fabrication materials, DuPont offers world-class materials and expert technical support for the fabrication and packaging of semiconductors.



*The miracles of science™*

## PRODUCT OFFERINGS AND PROCESS STAGES

	Lithography	Etch & Clean	Deposition	Planarization	Infrastructure
DuPont EKC Technology removers	●	●		●	
HD MicroSystems™ liquid polyimides & PBO	●				
DuPont Electronic Polymers — photoresist & ARC polymers	●				
DuPont Air Products NanoMaterials				●	
DuPont Fluoroproducts					
Teflon® fluoropolymers — high-purity fluid handling systems	●	●		●	●
Zyron® electronic gases		●	●		
Vertrel® specialty fluids		●			
Vespel® parts & shapes		●	●	●	●
DuPont Performance Elastomers — Kalrez® perfluoroelastomer parts	●	●	●		●
DuPont FE clean agent fire extinguishants					●
Tyvek® wafer interleaf					●
Sontara® cleanroom wipes					●
DuPont Personal Protection — protective apparel & accessories		●			●

## See where we are. Learn where we're going.

This chart provides a general overview of DuPont materials offered throughout the semiconductor fabrication process. The chart may be useful in determining if there are DuPont materials you'd like to consider for your specific operations. Inside this brochure, more product specifics are available for your review.

DuPont continues to develop new, dynamic and more integrated solutions to help customers and partners align to the industry roadmap. To learn more about the latest DuPont products and process developments, visit [semi-fabrication.dupont.com](http://semi-fabrication.dupont.com) and link to the "Science of Semiconductor Fabrication Material" section.

# Working together

A number of DuPont businesses are dedicated to providing materials science, applications know-how, manufacturing expertise and global market access to the semiconductor fabrication industry.

## DuPont EKC Technology removers

Leading solutions for the removal of photoresists, post-CMP contamination and post-dry etch process residue

## HD MicroSystems™ liquid polyimides

High-purity liquid polyimide and PBO coatings specifically engineered for microelectronic applications

## DuPont Fluoroproducts

**Teflon®** fluoropolymers — High-purity materials used in fluid handling systems

**Zyron®** electronic gases — For safe, superior dry etching and CVD/PECVD tool in-situ chamber cleaning

**Vertrel®** specialty fluids — For high-performance wafer cleaning and drying to prevent contamination

## Vespel® parts & shapes

Leading polymeric parts and shapes for front-end and back-end IC processing equipment

## DuPont Performance Elastomers

**Kalrez®** perfluoroelastomer parts — Parts manufactured by DuPont Performance Elastomers are specifically designed for aggressive wafer processing environments

**Viton®** fluoroelastomers — Parts made with Viton® offer excellent chemical and thermal resistance. Contact a Genuine Viton® licensee for specific part requirements.

## DuPont FE clean agent fire extinguishants

Extensive fire safety solutions, including halon-free fire extinguishants

## Tyvek® wafer interleaf

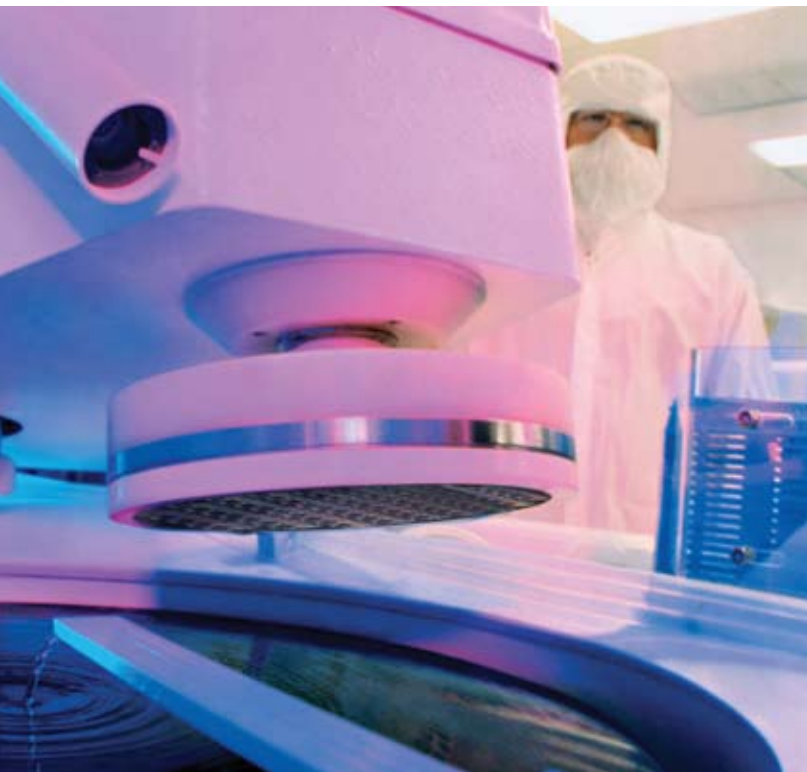
Superior material performance for contamination-controlled packaging

## Sontara® cleanroom wipes

Micro-level cleaning fabrics engineered to help prevent cleanroom contamination

## DuPont Personal Protection

Protective apparel and technologies designed to help safeguard workers, products and processes



## DuPont Electronic Polymers

High-quality, innovative polymers for KrF and ArF photoresist formulations, as well as anti-reflective coating formulations

## DuPont Air Products NanoMaterials

Differentiated products for CMP applications and Silicon wafer polishing

# Delivering essential solutions for critical processes

In virtually every process step, DuPont materials can help improve yield, reduce environmental emissions and enable customers to move beyond technical hurdles.



## LITHOGRAPHY

### POLYMER TECHNOLOGIES

DuPont Electronic Polymers provide polymers for KrF & ArF photoresist that enable significant advances in photolithography.

ARC polymers from DuPont Electronic Polymers reduce standing waves and other types of optical interference.

### PHOTORESIST REMOVERS

DuPont EKC Technology provides conservation-friendly chemicals to remove positive, negative, copper-compatible and wafer-level packaging photoresist process residue.

### MASK/RETICLE

Long recognized for its universal chemical resistance and thermal stability, Teflon® AF is a vital component used in pellicles to protect masks. Teflon® PFA/PTFE parts — tubings, fittings, valves and filters — play an important role in photoresist handling.

### HIGH-PERFORMANCE SEALING

Kalrez® perfluoroelastomer parts offer excellent chemical resistance to a diverse range of wet process chemicals, including acids, bases and amine-based strippers.

### LIQUID POLYIMIDE & PBO

Through a decade-long venture, DuPont and HD MicroSystems™ offer a broad product line of liquid polyimide and PBO materials for stress-buffer coatings, interlayer dielectrics, redistribution layers and high-temperature permanent adhesives.

## ETCH & CLEAN

### CLEANERS & REMOVERS

Non-flammable and non-combustible, aqueous and semi-aqueous organic mixtures from EKC Technology help maintain gate oxide integrity and improve contact between metal layers.

### SPECIALTY GASES

For over two decades, Zyron® electronic gases have been used in both dry etching applications, as well as CVD/PECVD in-situ chamber cleaning.

### IN CHAMBER POLYMER SOLUTION

DuPont™ Vespel® offers polymer parts designed to provide reliable mechanical performance in the most severe chamber conditions. Vespel® has good plasma resistance and is ultra pure so that in-chamber contamination is minimized.

### CLEANING AGENTS

Developed with performance and the environment in mind, DuPont™ Vertrel® specialty fluids offer low viscosity and surface tension, and high liquid density for excellent cleaning performance.

### HIGH-PERFORMANCE SEALING

Exhibiting improved cracking resistance, lower particle generation and longer seal life, Kalrez® perfluoroelastomer parts offer excellent sealing performance in aggressive dry etching and ashing/stripping process environments. In addition, Kalrez® perfluoroelastomer parts offer low metallic, anionic and total organic carbon (TOC) extractables in wet etching and cleaning processes.

The compliance of Vespel® delivers valve components that provide a more reliable seal, as Vespel® can conform to mating surface nicks and irregularities. Even very light gases like helium can be sealed in operating temperatures from cryogenic to 500°F. The low-wear and

friction characteristics help increase ease of operation and reduce the possibility of process contamination.

### HIGH-PERFORMANCE FLUID HANDLING

With excellent properties in chemical and thermal resistance, Teflon® fluoropolymers offer reduced contamination potential with low extractable anions that can contaminate aggressive high-purity chemicals.

## DEPOSITION

### CLEANING CHAMBER GASES

High-purity fluorinated Zyron® gases provide a fast, economical and low-emission cleaning for CVD and PECVD tools.

### HIGH-PERFORMANCE SEALING

Delivering outstanding thermal stability, very low outgassing and excellent elastic recovery, Kalrez® perfluoroelastomer parts offer low erosion and ultra-low particle generation in HDPCVD, PECVD, SACVD, Metal CVD and ALD deposition processes.

### CUSTOM PARTS

With ultra-high thermal resistance, excellent plasma and superior chemical resistance, Vespel® parts and shapes excel at CVD and PVD processes.



## PLANARIZATION

### CLEANERS

Post CMP cleaners from DuPont EKC Technology help prevent contamination through the effective removal of defects and residue deposited following copper, tungsten and STI CMP.

### CHAMBERS

Teflon® PFA coating is applied to CMP interior chambers, providing high-purity and greater corrosion resistance.

### SLURRIES

DuPont AirProducts NanoMaterials combines the expertise of DuPont with AirProducts global supply infrastructure to provide customers with high-performance, cost-effective products for Copper, Tungsten and STI CMP applications, as well as products for Silicon wafer polishing applications.

Teflon® PFA tanks and tubing bring high-purity, reduced metal extraction and chemical resistance properties to slurry supply systems.

### RETAINING RINGS

Utilizing newly developed polymer grades, Vespel® offers materials with enhanced chemical resistance that allow excellent wear performance for retaining rings, resulting in extended part life and reduced cost of ownership.

## INFRASTRUCTURE

To ensure safety and purity requirements, DuPont offers a broad range of materials to improve manufacturing equipment performance.

### FLUID HANDLING

DuPont™ Teflon® fluoropolymers are designed to handle the most aggressive fluids without concerns of process downtime due to contamination and reliability of components.

Kalrez® perfluoroelastomer parts resist chemical attack and minimize the potential for undesirable contaminants, even in the most aggressive chemical environments.

### WAFER HANDLING & END EFFECTORS

By minimizing the possibility of chemical attacks on the carrier, Teflon® fluoropolymers enable wafers to be processed in harsh acid environments without fear of wafer damage.

Kalrez® perfluoroelastomer parts offer outstanding thermal stability, very low outgassing and excellent long-term sealing performance at elevated temperatures.

DuPont™ Vespel® non-scratch, wear-resistant materials deliver ultra-low contamination. A newly developed conductive grade, Vespel® 202, offers a great solution for ESD issues. In addition, Vespel® high modulus composite finished parts for end effectors provide low deflection and improved vibration dampening.

### CORROSIVE FUME EXHAUST LININGS

Teflon® resins provide superior corrosion protection from gases exhausted from wet chemistry processes and complies with Factory Mutual's stringent requirements.

### CLEAN AGENT FIRE EXTINGUISHANTS

Safe, noncorrosive and free of residue, DuPont Fire Extinguishants protect highly sensitive semiconductor equipment where the potential damage from fire is exceptionally high as a result of the continued trend toward miniaturization.

### CLEANROOM WIPES

Micro-level cleaning fabrics from Sontara® offer low particle levels and natural absorbency to help eliminate potential contamination in cleanrooms.

### PROTECTIVE APPAREL

DuPont provides a complete line of apparel designed to help protect workers, products and processes from harmful materials. Tyvek® IsoClean™, Suprel® LS and ProClean® garments — available in bulk, clean or clean and sterile — and accessories create effective barriers against particles, microorganisms and non-hazardous liquids.

### WAFER PROTECTION

With inherently low friction, antistatic properties and electrostatic dissipative options, DuPont™ Tyvek® contamination-controlled interleaf protects wafers in critical handling and shipping systems.

DuPont: Your source for semiconductor fabrication materials.  
Visit [semi-fabrication.dupont.com](http://semi-fabrication.dupont.com) for more information.

©2007 E.I. du Pont de Nemours and Company. All rights reserved. The DuPont Oval Logo, DuPont™, The miracles of science™, IsoClean™, ProClean®, Sontara®, Suprel®, Teflon®, Tyvek®, Vertrel®, Vespel®, and Zyron® are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates. HD MicroSystems™ is a trademark of HD MicroSystems LLC, a joint venture company of Hitachi Chemical Co., Ltd and E.I. du Pont de Nemours and Company. Kalrez® and Viton® are registered trademarks of DuPont Performance Elastomers LLC.

NO PART OF THIS MATERIAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF DUPONT.

K-15720 6-07



*The miracles of science™*