3M Science. Applied to Life.™

Optimizing Semiconductor Fluid Handling Solutions with 3M Science.

3M™ Dyneon™ Fluoroplastics

High purity material solutions
to help protect chip purity
and increase yield

Advancing semicon. Enhancing lives.

At our fingertips and all around us, smart devices have revolutionized how the world connects—and how we connect with our world. 3M science helps the products, equipment and fluid-handling systems the semiconductor industry needs today to create the chips of tomorrow.

From the Internet of Things and trends in 5G, to virtual reality and self-driving vehicles, the growing demand for ever smaller, faster, and more powerful devices has never been greater. 3M brings decades of science-based expertise to a range of raw materials and fluid-handling solutions for chip manufacturing, helping innovators across the industry meet their demand and shape the future of the semiconductor industry.

3M™ Fluoroplastics for fluid handling. Purity. Precision. Performance.

As our lives and our devices become increasingly interconnected, advances in technology are pushing the limits of integrated circuits and chip design. At 3M, we produce ultra high purity PFA and PTFE materials that help enable the parts, equipment, and critical fluid delivery systems manufacturers need to maximize performance and yield.

Challenges around optimizing fluid handling systems

Semicon chip fabrication presents unique fluid-handling challenges, such as harsh cleaning and etching chemicals, high heat, and the need for handling ultra-pure water. Process contamination reduces reliability. As requirements get stricter, chip fabricators rely more than ever on the right materials. 3M™ Fluoroplastics help manufacturers protect against contamination, corrosion and leaching—minimizing downtime and enhancing equipment performance.

Reliable solutions backed by 3M science

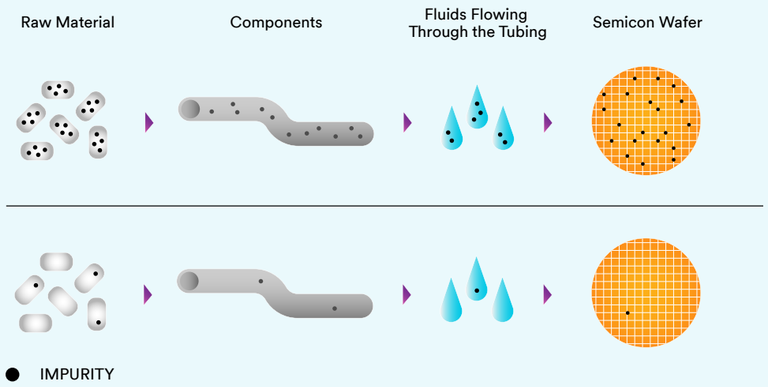
3M is a trusted partner serving industries around the world. Our decades of experience in fluoroplastic design and manufacturing, backed by extensive purity and application knowledge, make 3M ultra high purity PFA and PTFE an excellent choice for semicon fluid handling applications.

Our customers across the entire semicon value chain benefit from bench-to-bench 3M support, including material testing expertise and application insights.

Impurities can harm output

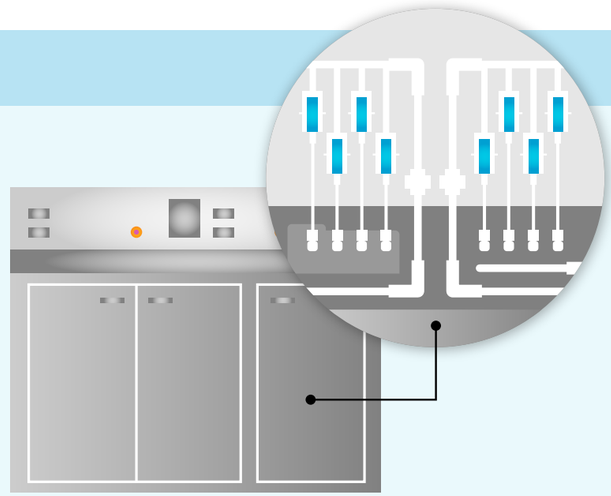
Contamination can cause issues throughout the semicon chip fabrication process.

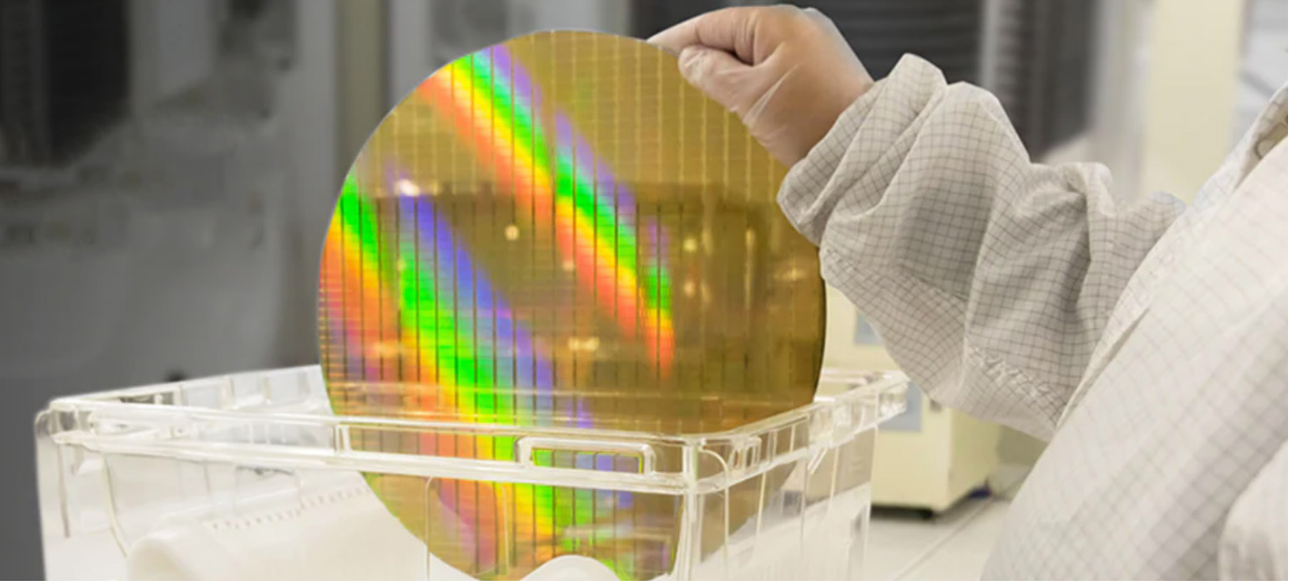
Utilizing high purity raw materials can help manufacturers reduce the potential for contamination throughout the process and protect yield.



Material purity for maximum yield

Proper materials can help protect against contamination and system failure while minimizing rinse downtime—ultimately enhancing equipment performance.

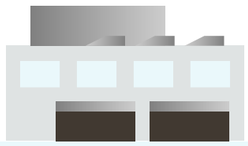




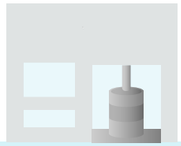
Semicon solutions from end to end

Our semicon material solutions start with 3M™ Fluoroplastics, but they're built on industry and application expertise. 3M raw materials, including ultra high purity PFA and PTFE, are engineered to maintain purity and integrity in some of the toughest conditions and many demanding chemical delivery system environments. Our semicon experts help innovators across the value chain tailor 3M material solutions to better serve their customers' needs and testing requirements.

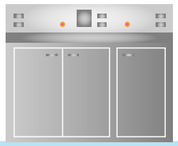
Four Value Chain Sectors



Tubing & Component Manufacturers



Chemical Manufacturers



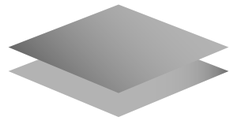
Original Equipment Manufacturers

Chip Fabricators (Fabs)

A handle on high-purity fluid handling

Max performance and chip yield come from minimum contamination and corrosion. Throughout the fabrication process, 3M™ Fluoroplastics deliver critical fluids like etching chemicals and ultra pure water so fabs can push the limits of their semiconductor chip and integrated device design.

Semifinished Goods

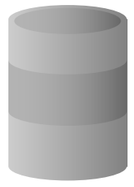


- PTFE and PFA sheets
- PTFE and PFA films

Chemical Distribution Systems

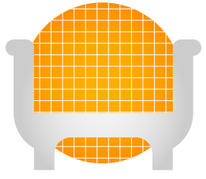
- PFA tubing and piping
- PFA valves and fittings
- PTFE gaskets and seals
- Anti-static PFA

Tanks and Containment Liners



- PFA drums and containers
- PFA and PTFE tanks and vessel liners
- PFA dip tubes and dispense systems

Components and Parts



- PFA wafer baskets and storage racks
- Anti-static PFA
- PTFE wafer handling and storage

Fluoroplastics for semicon fluid handling: PFA vs PTFE

PFA

Used primarily for its extreme resistance to chemical attack, broad temperature range, and transparency relative to PTFE, PFA, is melt processable through extrusion and injection molding. Its thermoplastic behavior allows vastly higher productivity when manufacturing injection-molded parts.

3M™ Dyneon™ Ultra High Purity PFA is engineered to withstand some of the toughest conditions while maintaining purity and integrity. Every lot is tested to meet the SEMI C90 standard, guaranteeing quality and consistency that enable ultra high-purity tubing and components needed in the semicon industry.

PFA Applications

- **Tubing**
- **Wafer Carriers**
- **Pumps**
- **Fittings**
- **Valves**
- **Linings**

PTFE

A fully fluorinated plastic with applications in nearly every industry, PTFE is an indispensable problem solver. Its low permeability and coefficient of friction, wide service temperature range, universal chemical resistance, and long service life make it ideal for manufacturing compression molded semifinished parts.

3M™ Dyneon™ PTFE is engineered for technical excellence and reliability in low volume end use applications such as liners and wafer baths.

3M™ Dyneon™ TFM™ Modified PTFE offers a modified PTFE polymer structure that provides enhanced properties including low surface roughness and improved mechanical properties.

PTFE Applications

- **Basins**
- **Wafer Carriers**
- **Linings**
- **Pumps**
- **Gaskets**
- **Filters**

Which raw material is right for your application?

When it comes to PFA versus PTFE/TFM, which is better depends on your specific application, budget allocation and finished quanitity requirements.

Material Properties

While each fluoroplastic provides excellent chemical and temperature resistance, PTFE offers more mechanical strength. Its material cost is also lower but it may require higher labor costs. This makes PTFE ideal for molding smaller quantities of finished parts.

Material Processibility

An essential difference between PTFE/TFM and PFA is the processability. For small run applications and unique and custom parts PTFE and TFM are often selected due to their lower cost profile for custom shaping. By contrast PFA, due to its ability to be melt processed, is well suited to high volumes making it an ideal economical choice for mass production.

PFA PTFE PTFE TFM

Material Properties	Good	Better	Best
Processing Properties	PTFE	PTFE TFM	PFA
Chemical Resistance			PFA PTFE PTFE TFM
Wide Service Temperature Range			PFA PTFE PTFE TFM
Optical Transparency	PTFE	PTFE TFM	PFA
Limiting Oxygen Index (LOI)			PFA PTFE PTFE TFM
Surface Roughness	PTFE	PTFE TFM	PFA
Permeation	PTFE	PFA	PTFE TFM

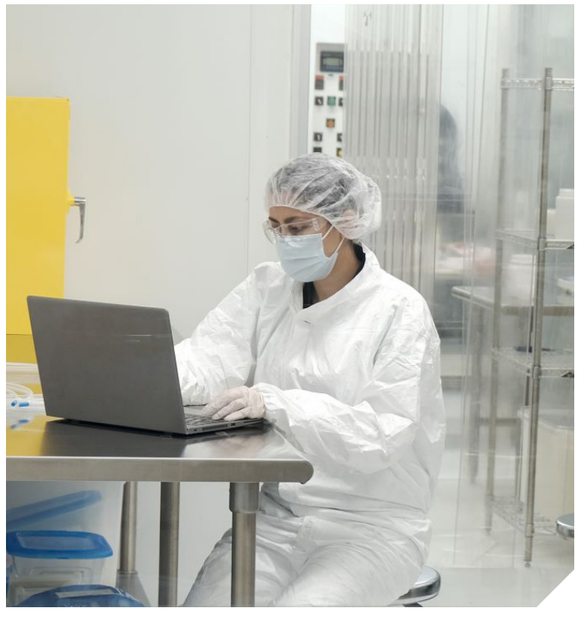
A global partner for the world of semicon

Invested in the advancement of semicon

At 3M, we apply science in collaborative ways to enhance lives daily. Our skilled researchers at service labs around the globe continue to develop and improve fluoroplastics for semicon. Our applications specialists are here to help you select and handle materials to ensure the smoothest transition into your manufacturing process.

3M™ Fluoroplastics are only the beginning

While we produce premier raw materials, 3M expertise is deeply involved throughout the semicon value chain, including SEMI standards testing and troubleshooting every step of the way. As a global company, we have application engineers and testing capabilities around the world. Our material experts are available to apply extensive research and development catered towards the semiconductor industry—delivering solutions to the toughest challenges.



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