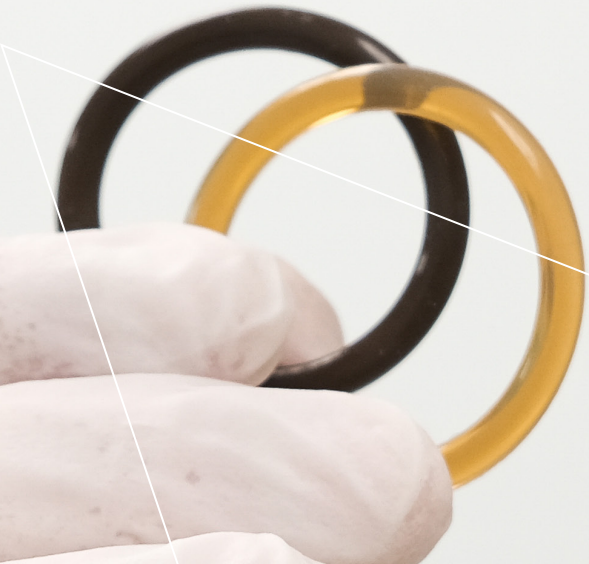
3M Science. Applied to Life.™



3M™ Dyneon™ Fluoropolymers

Optimizing Semiconductor Equipment & Maintenance for High Performance Seals and Gaskets.

3M™ Dyneon™ Perfluoroelastomers (PFE)
3M™ Dyneon™ Fluoroelastomers (FKM)

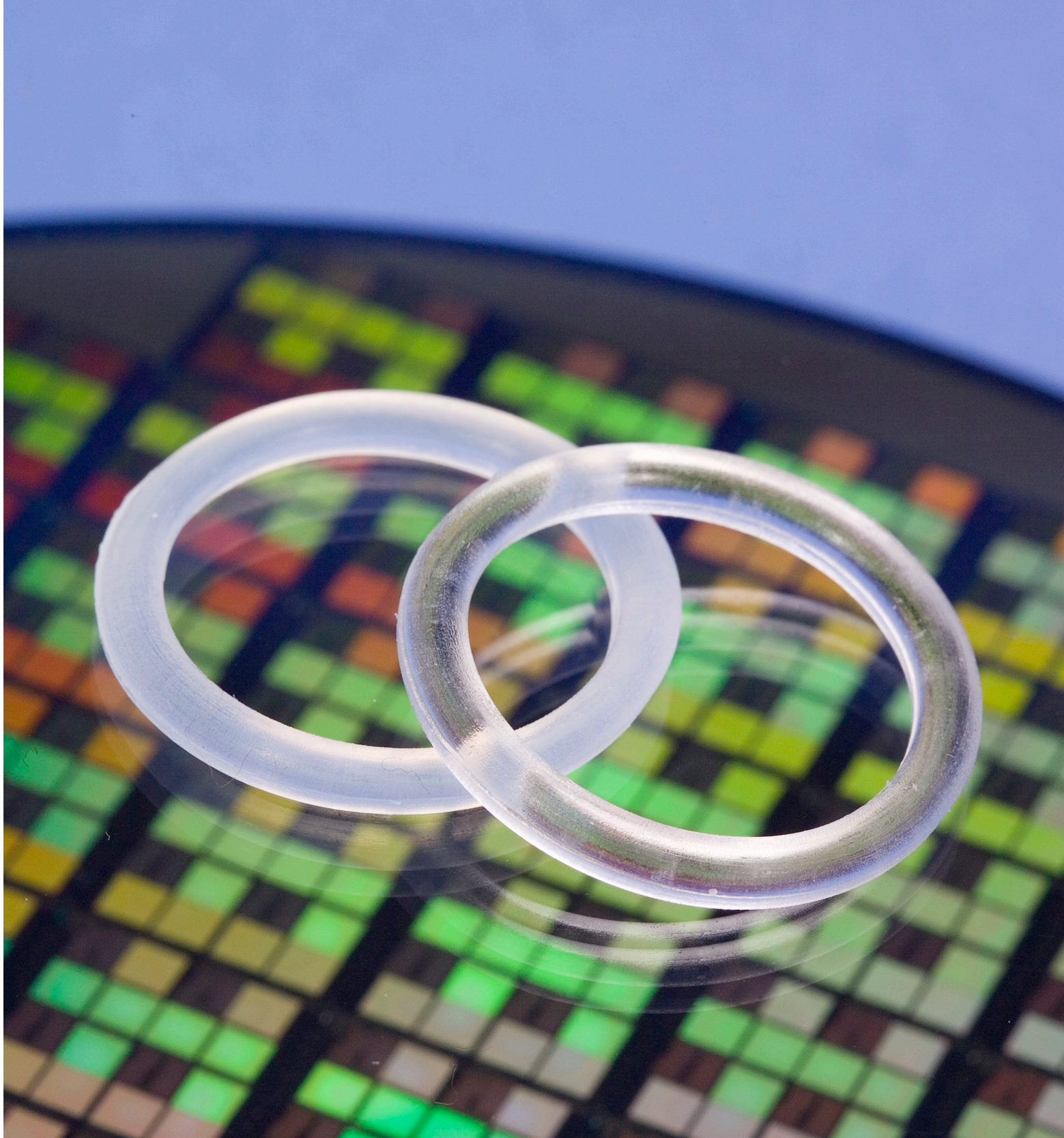
Solutions for some of the most crucial parts of semiconductor equipment.

In the challenging business of semiconductor manufacturing, the right seals and gaskets can have a tremendous effect on your production efficiency. Crucial parts like o-rings and chamber seals must stand up to harsh chemicals and a range of temperatures – and that's just the start.

Fluoropolymers are essential for seals in the semiconductor manufacturing industry.

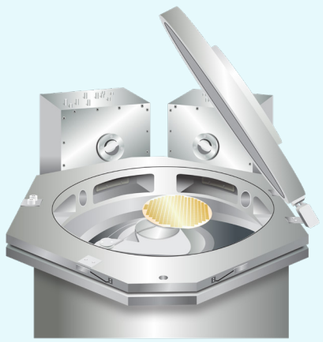
Sealing applications in etching, ashing, and deposition equipment require some of the toughest solutions due to their extended exposure to high temperature, different plasmas, and harsh chemicals.

The right seals can help you maintain your production goals, keep equipment performing longer, reduce maintenance and minimize downtime. When they're made using fluoropolymers from 3M, they can be tailor made to target your specific needs.



Typical Applications:

- Chamber lid seal
- Gate valve seals for load lock
- O-rings
- Bonded seals
- Pump linings



The ideal seal materials for your specific semiconductor operations.

To keep up with a fast-moving industry, it's never been more important for semiconductor manufacturers to ensure their equipment performs at peak capacity. Processes such as deposition, etching and plasma ashing create extremely harsh conditions that can quickly degrade equipment components.

Here's how 3M™ Dyneon™ Fluoropolymer solutions can help you specify the ideal seals and gaskets, and improve your total output and efficiency.

3M™ Dyneon™ Perfluoroelastomers (PFE/FKKM)

Our high temperature and peroxide cure PFEs are excellent for seals that must perform under moderate to extreme conditions. For dry-side applications, 3M high-temp PFE solutions stand up to temperatures as high as 315°C, along with high compression set and excellent plasma and chemical resistance. We also have peroxide curable PFEs for lower-temperature applications up to 230°C.

Seals and gaskets manufactured using our high temperature PFEs combined with our proprietary catalysts can optimize the performance even more, optimizing stiction capabilities for ease of maintenance and replacement.

3M™ Dyneon™ Fluoroelastomers (FKM)

Our peroxide curable FKM solution can resist a broad range of chemicals, has low metal ion content, and is an ideal choice for lower temperature applications (up to 230°C). It also has an incorporated polymeric filler for reinforcement with less particle generation. It's an excellent cost-effective solution for select applications.

Cost of ownership: how seals can optimize your semiconductor production

To realize the total value of your semiconductor equipment, you must look beyond the initial part cost toward longer-term performance. Your choice of seals also affects your costs related to downtime for seal installation and replacement, as well as the frequency of required downtime for maintenance. Once you know your total costs, you can realize the true value of your equipment investment.

Cost of the seal

A wide range of 3M solutions can give you plenty of choices to specify the best seals for your material cost budget.

Installation costs

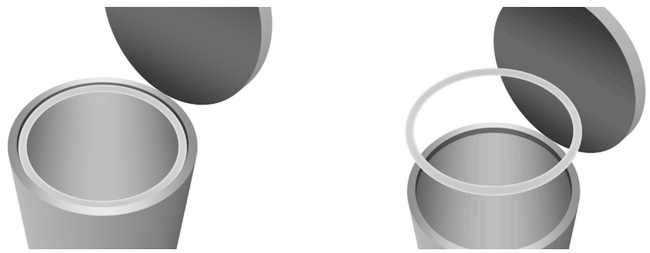
3M PFEs combined with proprietary catalysts can produce a low-stick layer that makes seal installation and replacement faster and easier.

Downtime costs

Seals optimized for your particular needs – chemical resistance, compression set, plasma resistance and more – can help you extend seal life and keep your machines running longer.

Reducing maintenance and downtime

Especially in high-temperature applications, seals can stick to the mating surface over time – making them difficult to remove and replace. 3M high-temperature PFE, combined with certain 3M catalysts/curatives, can create a low-stick layer that allows used seals to remove more quickly and cleanly, and makes installation and replacement faster.



Performance where you need it most: A complete range of fluoropolymer solutions

High Temperature Resistance

Our high temperature material solutions are capable of excursions above 315°C with dependable performance under tough conditions. They are commonly used in etching and deposition applications.

Featured products:
- 3M™ Dyneon™ High Temperature Perfluoroelastomer PFE 81T
- 3M™ Dyneon™ High Temperature Perfluoroelastomer PFE 131T
- 3M™ Dyneon™ High Temperature Perfluoroelastomer PFE 191T

Plasma Resistance

Material solutions deliver with proven performance for exposure to plasma gases including NF3, O2, SF6, CF4 and Ozone, while resisting material breakdown to reduce contamination risks. They are commonly used in etching applications.

Featured products:
- 3M™ Dyneon™ High Temperature Perfluoroelastomer PFE 132TB
- 3M™ Dyneon™ High Temperature Perfluoroelastomer PFE 133 TB
- 3M™ Dyneon™ High Temperature Fluoroelastomer FPO 942HB

Chemical Resistance

Material solution delivers strong resistance to harsh chemicals including H2O2, water, sulfuric acid and others to resist breakdown and reduce risk of contamination. It is commonly used in wet and subfab applications.

Featured product:
- 3M™ Dyneon™ Peroxide Cure Perfluoroelastomer PFE 40

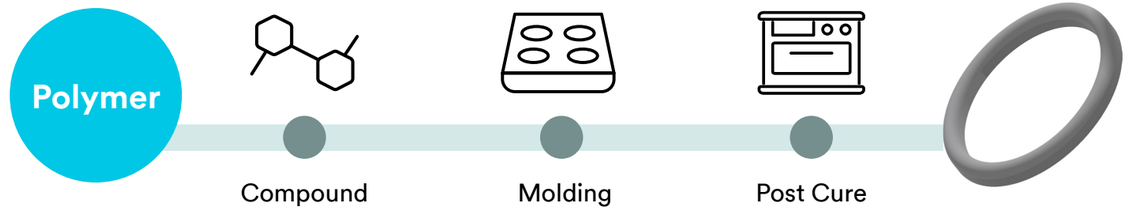
3M™ Dyneon™ Sealing Materials

Polymer Property Comparison Summary

++ Excellent Resistance (little to no effect)
+ Good Resistance (moderate effect)
- Not Recommended (substantial effect)

Chemical Resistance	3M™ Dyneon™ HT PFE	3M™ Dyneon™ PO PFE	3M™ Dyneon™ FPO 942HB
Acids	++	++	++
Bases	++	++	-
Ethylene Diamine	+	++	-
Steam/Water	-	++	++
Solvents (aliphatic/aromatic)	++	++	++
Ketones	++	++	-
Temperature Resistance			
Upper Use Temperature (°C)	315	232	232
Purity			
Metal Ion Content	++	++	++
Plasma Resistance			
Fluorine Plasma	++	-	+
Oxygen Plasma	++	-	++

Not for specific use



Invested in the advancement of semicon

At 3M, we know the challenges and customizations needed for high-performing semiconductor seals. We also know how vital they are for minimizing the Total Cost of Ownership of your semiconductor equipment. Together, we can help you optimize your end product designs to exact specifications from initial polymer and catalyst selection through recipe optimization and processing to testing and results confirmation.

Our material experts are well-versed in polymers and catalysts and backed by a century of experience in materials science, as well as chemistry, compounding and decades of work in the electronics industry. Our application engineers employ robust laboratory testing using equipment to simulate the latest semiconductor processes.

Contact 3M to discuss your high-performance semiconductor sealing requirements.

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