victrex®

HIGH PERFORMANCE PEEK POLYMERS

VICTREX® PEEK POLYMER FOR CMP RINGS

VICTREX PEEK is a semi-crystalline material with an ability to withstand extreme environments. It is generally considered to be the highest performance, melt processable polymer on the market today. VICTREX PEEK is widely accepted in the semiconductor market for applications requiring an excellent balance of properties.

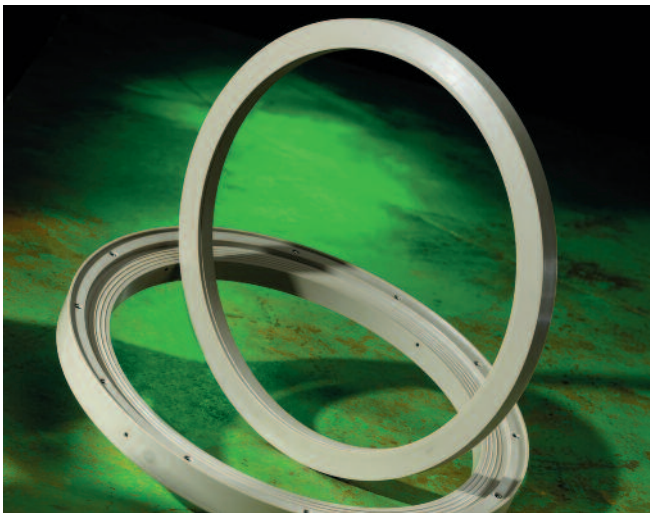
CMP RETAINING RINGS

VICTREX PEEK performs extremely well in all CMP processes. It is ideally suited for CMP retaining rings because of its:

- Outstanding wear properties
  - better wear resistance than PPS in all processes
  - better ring uniformity across CMP ring face
- Low defectivity rates
  - VICTREX PEEK rings demonstrate equivalent or better defectivity rates vs. PPS
- Flexible processing
  - injection molding, extrusion and compression molding
- Easy to machine and outstanding dimensional stability
- Inherently pure and very stable
  - low particle shedding, low extractables
- Resistant to broad range of CMP chemical environments
  - pH range of VICTREX PEEK: 2-14
- Excellent cost/peformance balance
  - lower per wafer processing cost than PPS
- Wear properties can be customized with fillers
  - up to eight times the life of a PPS ring

FILLER TECHNOLOGIES AVAILABLE

VICTREX PEEK can be modified with a wide variety fillers to enhance properties such as wear, stiffness and dimensional stability.

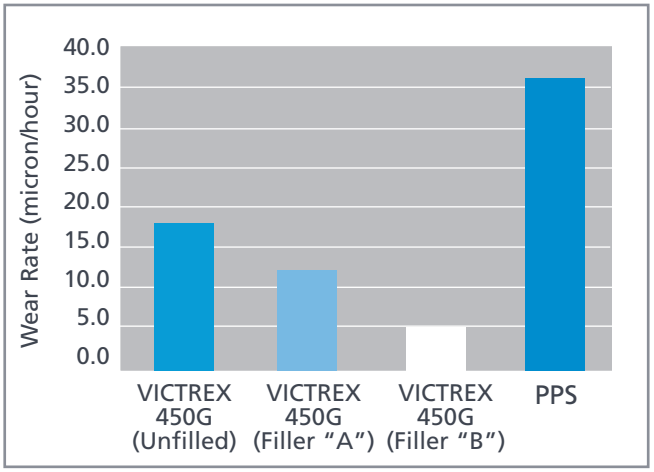


VICTREX PEEK CMP rings resist wear from abrasive slurries used to process wafers.

VICTREX PEEK VS. PPS WEAR RATE COMPARISON IN OXIDE SLURRY*

Both unfilled and filled versions of VICTREX PEEK ring demonstrate superior wear performance, low defectivity rates and excellent cost per wafer productivity vs. PPS.

Rate of Wear of VICTREX PEEK vs PPS in Oxide Slurry



* Data generated on the Center for Tribology CMP tester using Rodel pads and SS12 oxide slurry. Results are confirmed in numerous fab environments.

www.victrex.com

victrex®

FOR CMP RINGS

MATERIAL PROPERTIES OF VICTREX PEEK

450G – Standard viscosity grade for injection molding and extrusion.
450GL30 – Standard viscosity, 30% glass fiber reinforced grade for injection molding and extrusion.
450CA30 – Standard viscosity, 30% carbon fiber reinforced grade for injection molding and extrusion.

Please consult with Victrex if you need recommendations or information on custom-filled grades of VICTREX PEEK for ESD, wear resistance or tight tolerances.

General		Test Method	Units	VICTREX 450G	VICTREX 450GL30	VICTREX 450CA30
Density	Crystalline Amorphous	ASTM D792	g/cm^3	1.30 1.26	1.51 –	1.40 –
Typical Crystallinity		N/A	%	35	30	30
Water Absorption	24 hours, 73°F (23°C) Equilibrium, 73°F (23°C)	ASTM D570	%	0.50 0.50	0.11 –	0.06 –
Mechanical						
Tensile Strength	Yield, 73°F (23°C) Yield, 482°F (250°C)	ASTM D638 (2 in min^{-1})	psi (MPa)	14,065 (97) 1,850 (13)		
	Break, 73°F (23°C) Break, 482°F (250°C)	ASTM D638 (0.2 in min^{-1})	psi (MPa)		24,000 (165) 4,,300 (30)	33,000 (227) 8,700 (60)
Tensile Elongation	Break, 73°F (23°C) Yield, 73°F (23°C)	ASTM D638 (2 in min^{-1})	%	> 60 5.0	 2.1	
	Break, 73°F (23°C)	ASTM D638 (0.2 in min^{-1})	%		2.7	1.8
Flexural Modulus	73°F (23°C) 248°F (120°C)	ASTM D790	psi (GPa) psi (GPa)	597,000 (4.1) 580,000 (4.0)	1,480,000 (10.2) 1,334,000 (9.2)	2,700,000 (18.6) 2,697,000 (18.6)
Flexural Strength	73°F (23°C) 248°F (120°C)	ASTM D790	psi (MPa)	22,400 (154) 14,500 (100)	33,500 (231) 25,375 (175)	48,000 (331) 37,700 (260)
Shear Strength	Ultimate, 73°F (23°C)	ASTM D3846	psi (MPa)	7,685 (53)	14,065 (97)	14,065 (97)
Shear Modulus	73°F (23°C)	ASTM D3846	psi (GPa)	188,500 (1.3)	348,000 (2.4)	–
Compressive Strength	Flow, 73°F (23°C) 90° to Flow, 73°F (23°C)	ASTM D695	psi (MPa)	17,110 (118) 17,255 (119)	31,175 (215) 21,605 (149)	34,800 (240) 22,185 (153)
Izod Impact Strength	0.01" Notched, 73°F (23°C) Unnotched, 73°F (23°C)	ASTM D256	ft lb/in (kJm^{-1})	1.18 (63) no break	2.25 (120) 13.54 (725)	2.25 (120) 12.04 (640)
Thermal						
Melting Point (Peak of Endotherm)		DSC	°F (°C)	649 (343)	649 (343)	649 (343)
Glass Transition Temperature (T_g)		DSC	°F (°C)	289 (143)	289 (143)	289 (143)
Specific Heat Capacity		DSC	Btu/lb°F (kJ/kg-°C)	0.52 (2.8)	0.41 (1.72)	0.44 (1.84)
Thermal Conductivity		ASTM C177	Btu-in/hr-ft^2°F (W/m-°C)	1.73 (0.25)	2.98 (0.43)	6.38 (0.92)
Coefficient of Thermal Expansion	(<T_g) (>T_g)	ASTM D696	10^{-5}/°F (10^{-5}/°C)	2.6 (4.7) 6.0 (10.8)	1.2 (2.2) –	0.8 (1.5) –
Heat Deflection Temperature at 264 psi		ASTM D648	°F (°C)	306 (152)	599 (315)	599 (315)
Continuous Use Temperature		UL 746B	°F (°C)	260 (127)	240 (116)	–
Fire, Smoke and Toxicity						
Flammability Rating		UL 94		V-O@1.5 mm	V-O@1.5 mm	V-O@1.5 mm
Electrical						
Dielectric Strength	0.002 in. film	ASTM D149	V/mil (KVmm^{-1})	4,800 (190)	4,400 (175)	–
Relative Permittivity	50 Hz, 32-302°F (0-150°C) 50 Hz, 392°F (200°C)	ASTM D150		3.2 4.5	3.7 –	– –
Volume Resistivity		ASTM D257	10^{16} Ω-cm	4.9	1.0	–

NOTE: Properties based on injection molded test specimens.

World Headquarters
Victrex plc
Hillhouse International
Thornton Cleveleys
Lancashire FY5 4QD
United Kingdom
Tel: + (44) 1253 897700
Fax: + (44) 1253 897701
Email: victrexplc@victrex.com

Americas
Victrex USA Inc
300 Conshohocken State Road
Suite 120
West Conshohocken, PA 19428
USA
Tel: + (1) 800-VICTREX
Tel: + (1) 484-342-6001
Fax: + (1) 484-342-6002
Email: americas@victrex.com

Europe
Victrex Europa GmbH
Langgasse 16
65719 Hofheim/Ts.
Germany
Tel: + (49) 6192 96490
Fax: + (49) 6192 964948
Email: eurosales@victrex.com

Asia Pacific
Victrex Japan Inc.
Mita Kokusai Building Annex
4-28, Mita 1-chome
Minato-ku
Tokyo 108-0073
Japan
Tel: +81 (0)3 5427 4650
Fax: +81 (0)3 5427 4651
Email: japansales@victrex.com

Asia Pacific
Victrex High Performance
Materials (Shanghai) Co Ltd
Part B Building G
No. 1688 Zhuanxing Road
Xinzhuang Industry Park
Shanghai 201108
China
Tel: + (86) 21-6113 6900
Fax: + (86) 21-6113 6901
Email: scsales@victrex.com