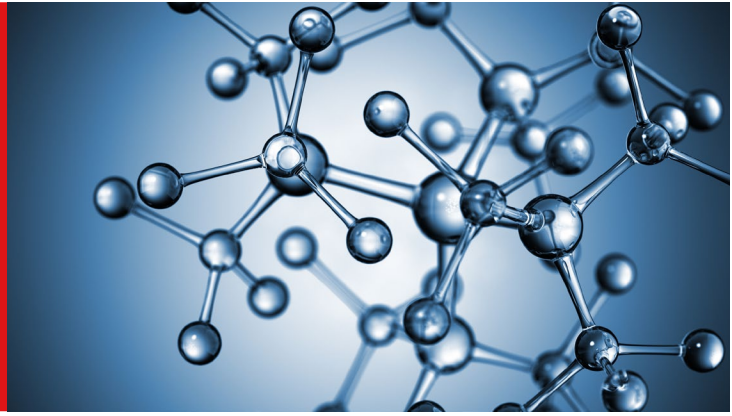


CyclAFlor™ Clear

Optical Amorphous Fluoropolymers



As you know, amorphous fluoropolymers have special properties – these materials can be transparent, chemically inert, water- and oil-repellent, stable at high temperatures, soluble in perfluorinated solvents. These properties make them attractive in a variety of demanding industrial applications – anti-reflective and protective coatings, gas separation membranes, high-bandwidth/low-attenuation optical fibers, and many others.

So, why aren't they used more widely? Lack of customization. Cost.

Until now, these materials were only available in a very limited number of standard formulations from a select few manufacturers at high cost. Customers could only justify the price if they solved at least two critical requirements – say, optically transparent and chemically resistant at high temperatures – and no comparable, lower-priced, substitutes were available. Even then, you were all but certain to be compromising your exact performance requirements.

Not any more...

Now you don't have to settle for an expensive, off-the-shelf composition that is not optimized for your specific needs. Chromis Technologies engineers amorphous fluoropolymers to do exactly what you want.

We've updated 1960s fluorochemistry to meet today's needs. We've invented cutting-edge cyclic fluoromonomer synthesis, polymerization, and post-polymerization processing methods that expand possibilities and eliminate the need for fluorosurfactants such as PFOA/PFOS/GenX. Our proprietary methods allow us to do such things as:

- ▶ customize functional groups
- ▶ control molecular weight and polydispersity
- ▶ increase or decrease viscosity
- ▶ vary temperature performance
- ▶ make the material more or less soluble in selected solvents

For example, our standard CyclAFlor™ Clear amorphous fluoropolymer is virtually identical to AGC CYTOP™ in composition and basic properties, and we can vary its characteristics to optimize its performance for your application.

If you have a technical challenge that could be solved with an amorphous fluoropolymer, call us. We have either already developed it or can use our expertise and technology to engineer a specific solution.

At Chromis Technologies, we focus on exactly what you want.



Engineering fluoropolymers to do exactly what you want.

Frank J. Graziano, CEO

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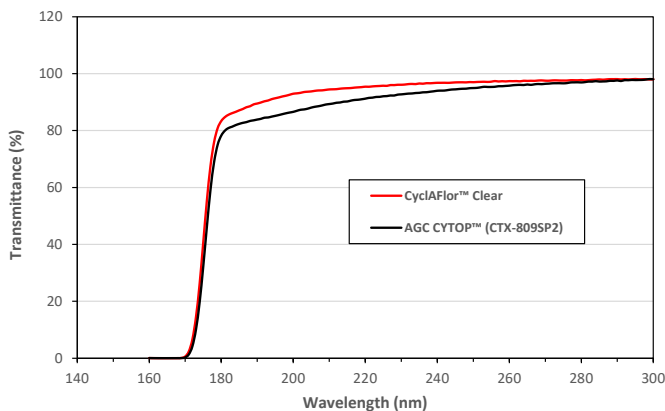
www.chromistechnologies.com

CyclAFlor™ Clear Details

Properties	CyclAFlor™ Clear	AGC CYTOP™	CyclAFlor™ Clear Options
Polymer composition	PBVE homopolymer	PBVE homopolymer	
Resistant to hydrocarbons and other chemicals			
Standard functional group	-CF ₃	-CF ₃ , -COOH, -CONH ~ Si(OR) _n	-COOH and custom end groups
Number average molecular weight (Mn)	Mn _{low} = 120,000 Mn _{high} = 250,000	Low = 150,000 – 200,000 Standard = 250,000 – 300,000	Mn and polydispersity can be adjusted to specific targets
Density	2.03 g/cm ³ @ 25°C	2.03 g/cm ³ @ 25°C	
Retains strong physical properties at elevated temperatures			
Glass transition temperature (T _g)	108°C	108°C	
Onset of thermal decomposition	>400°C		
Unique optical characteristics are suitable for optical fiber core and cladding, UV environments			
Refractive index	1.34 (589 nm at 20°C)	1.34 (589 nm at 20°C)	
Light transmittance	>95% (visible range, 200 μm film)	>95% (visible range, 200 μm film)	
Light absorption (internal transmittance)	<0.1% (>99.9%) @ 280 nm – 1,000 nm, 5 mm plaque	<0.1% (>99.9%) @ 250 nm – 1,700 nm, 5 mm plaque	
Ideal properties for water- and oil-repellent applications			
Contact angle with water	113° @ 23°C and 70% RH	112°	
Critical surface tension	19 mN/m	19 mN/m	
Can be easily applied as a solution to a wide variety of substrates as a very thin (sub-micron) coating			
Solvent	perfluorotributylamine	PFC, HEF, HFC	other solvents available
Solvent boiling point	180°C	180°C (PFC), 100°C (HFE, HFC)	
Solution concentration	9 ± 0.25%		custom concentrations available
Filtration	0.2 μm	0.2 – 5.0 μm	custom filtration available

CyclAFlor™ Clear is comparable to AGC CYTOP™ in its standard formulation and can be engineered to better meet your needs.

**Typical UV Transmittance
CyclAFlor™ Clear vs. CYTOP™**
(200 μm thin films)



**Typical Thermal Gravimetric Analysis (TGA)
CyclAFlor™ Clear vs. CYTOP™**

