



Link™

AL-3349, 3351, 3355

Optical Epoxy Siloxane

For photonics and microelectronics

ÅNGSTRÖM Link™ KEY FEATURES

- Compatible with CMOS fabrication techniques
- Very low, stable dielectric
- Very low leakage
- Excellent thermal stability
- Low moisture absorption

ÅngstromLink AL-33xx series of materials are optically clear, with excellent stability and processing capabilities. The products feature a siloxane backbone with epoxy functional groups. This combination provides for extremely stable mechanical, electrical and optical properties at, or after exposure to, high temperature.

The uncured material is soluble in a variety of solvents for processing, while the cured material shows excellent chemical and solvent resistance. Depending on the catalyst used, it is both UV and heat curable. At room temperature, these materials show long pot life for ease of processing. Spinability and coating thickness uniformity are very good across large areas (12 inch wafers). This series of materials can be photoimaged and etched for thin film processes.

The product is supplied in a ready-to-use syringe. These materials offer a service temperature range of -40°C to + 350°C (+400°C for short periods of time).

Applications

Fabricating waveguides on printed circuit boards

Dielectric films

Molding microlens arrays

Benefits

Thermal cure and photoimageable versions

Good adhesion to silicon dioxide, copper and aluminum

Low optical absorption loss - .005 – 0.3 dB/cm
(depending on wavelength)

Thermally stable, up to 350°C
(400°C for short periods of time)

Excellent chemical resistance

Refractive index range of 1.49 to 1.55

(revision 06/2010)

For more information on this or other products and their availability, please contact us at:
1-800-IS-FIBER (473-4237); (508) 992-6464; Fax us at (508) 991-8876, or via email at sales@focenter.com
Please visit us on the web at WWW.FOCENTER.COM

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Property (at 25°C unless noted)	Test Method	Typical Value
Cure Processing Characteristics		
Uncured mixed viscosity	ASTM D-1084	4000 cP, typical
Cure Time / Heat Cure	Visual	135°C minimum for 1 hr
Cure Time / UV Cure	Visual	700mJ for a 15-20µ film
Cured Mechanical Properties		
Appearance	Visual	Clear
Physical Consistency	Visual	Glassy Solid
Hardness	Shore D	70-75
Modulus	-	5 GPa (@ 20nm nanoindent)
Shrinkage	-	0.2, typ
Specific Gravity	ASTM D-1217	1.15
Cured Thermal Properties		
Glass Transition	DSC	330°C, Slowly degrades above 400°C
Coefficient of Thermal Expansion	-	55 x 10 ⁻⁶ cm/ °C (0-300°C)
Moisture absorption	85/85	< 0.5%
Thermal decomposition point	TGA	> 400°C
Cured Electro-optical Properties		
Leakage	-	<10 ⁻⁸ A/cm ² @ 2 – 4 MV
Volume Resistivity	ASTM D-257	> 10 ¹⁵ ohm-cm, est.
Dielectric Constant	-	2.4 - 2.8
Refractive Index, 589 nm	ASTM D-1218	1.52
Refractive Index vs. Temperature, 589 nm	ASTM D-1218	- 3.9 x 10 ⁻⁴ /°C
Refractive Index vs. Wavelength	prism coupler	(see chart)
Optical Absorption	spectrophotometer	(see chart)

Recommended Cure Schedules

UV Cure

Exposure Type	Broadband UV light source
Dose	10mW / 12s

Thermal Cure

Minimum Temperature	135°C
Recommended Range	150 - 165°C
Cure	45 minutes @ 155°C
Snap Cure	175°C for 15 seconds
Anneal	90 minutes @ 250°C (under inert atmosphere)

UV plus Thermal

Exposure Type	Fusion "H" Bulb
Dose	12 mW / 5 seconds
PEB	30 minutes @ 135°C

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Thin Film Processing Parameters

Typical Photo Cure Cycle

40-60 minutes drying @70-100°C
Photo exposure – 500 – 2000 mJ/cm² @250-365nm
Short soft bake if needed
Developer (i.e. PMA, MEK, IPA...)
Final bake cycle / 1-2 hours @ 150-165°C

Typical Thermal Cure Cycle

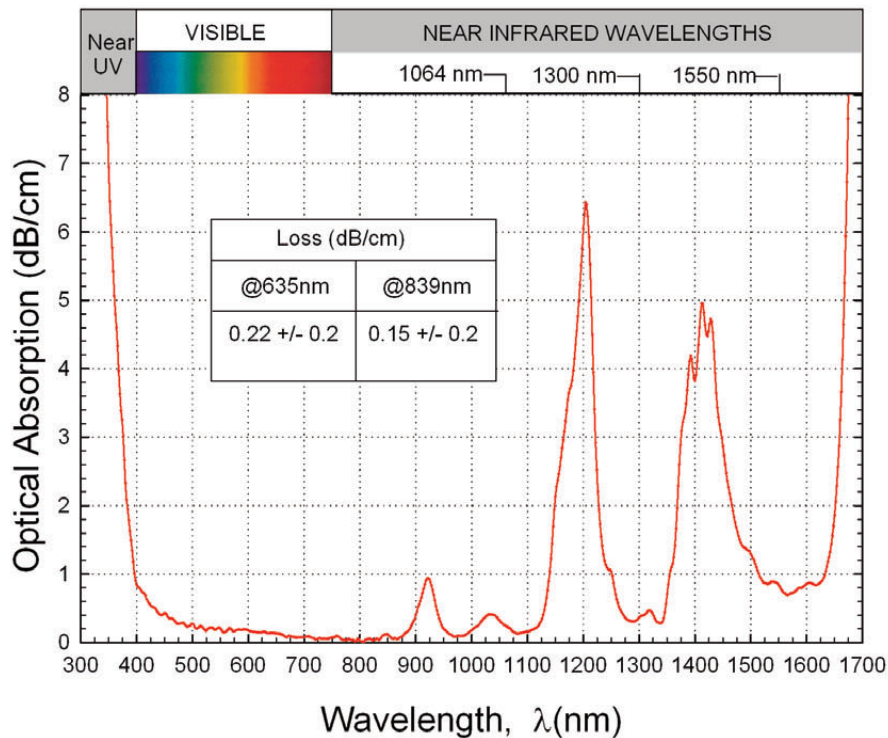
40-60 minutes drying cycle @ 70-100°C w/wo vacuum
1-1½ hours cure cycle @ 165°C w/wo N₂ blanket
2-3 hours annealing @ 250-300°C under N₂

To obtain best optical quality films, use the thermal cure version of these materials. AL-33xx materials can be diluted to 20 to 80% solids content for different film thicknesses with MEK, PMA or Mesitylene. RPMs for spinning vary between 300 and 6000. Typical adhesion promoters are HMDS and A-3000.

CF₄/O₂ reactive ion etching is recommended. Wall smoothness can be controlled by adjusting etching parameters.

Optical Absorption vs Wavelength

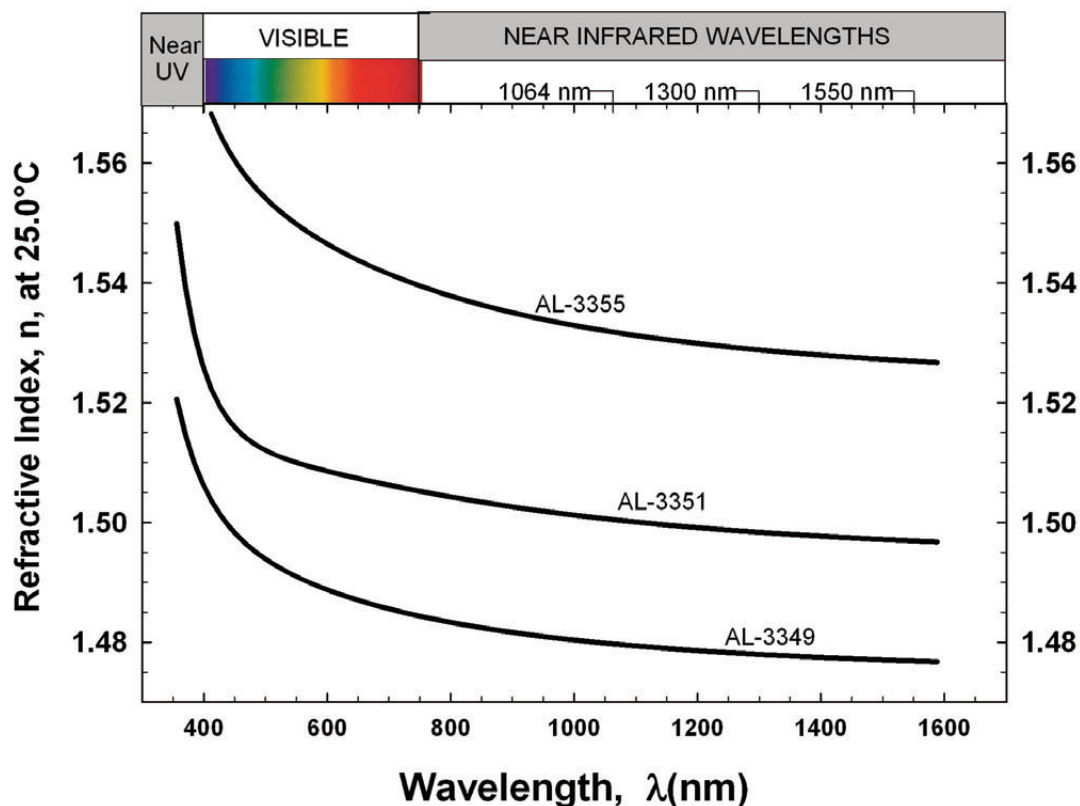
AngstromLink Optical Epoxy Siloxane AL-3349, AL-3351 and AL-3355



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Refractive Index vs Wavelength (25°C)
 AngstromLink Epoxy Siloxane
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Substrate Preparation

Clean substrates using suitable industrial techniques for cleaning electro-optics. Oxide grown layers typical of CMOS fabrication techniques are frequently used as substrates. Typical adhesion promoters are HMDS and A-3000. If hydrocarbon solvent cleaning (e.g. acetone, toluene) is used, a final rinse with reagent grade isopropanol is recommended. If aqueous detergent cleaning is used, multiple final rinses with de-ionized water or a single rinse with reagent grade isopropanol is recommended. Improved adhesion to some substrates may be obtained using suitable primers such as HMDS and A-3000.

Cleanup

AL-33xx materials may be removed from surfaces by first wiping off excess gel with a suitable dry lint-free wipe and then by wiping down the surface with a lint-free wipe soaked with acetone. If the surface material is incompatible with acetone (acetone can soften or crack some plastics) use isopropanol. If acetone residues are undesirable, the clean-up process should be completed with a final rinse with reagent grade isopropanol. The user is responsible for compliance with all applicable regulations governing disposal of waste materials as indicated in the MSDS.

Packaging

AL-33xx materials are supplied in a 30cc one-part syringe that is compatible with most manual dispensing guns and automated dispensing systems. For other container options contact Fiber Optic Center.

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Specifications

The typical properties quoted on this product data sheet should not be used as a basis for preparation of product specifications, and may change without notification. Because we cannot anticipate or control the many different conditions under which this information and our products may be used, we cannot guarantee the applicability of this information or the suitability of our products in any individual situation. Consult Fiber Optic Center for assistance with establishing specification limits and test conditions. Statements concerning the possible use of our products are not intended as recommendations to use our product in the infringement of any patent.

Shelf Life

AL-33xx materials have a limited shelf life (6 months from date of manufacture when stored in its unopened original container under the storage temperature range noted on the product label). Use of a product after the expiration date shown on the package, or use of a product which has been improperly stored, may result in improperly cured material.

Warranty

AL-33xx materials are sold without warranty, express or implied. Fiber Optic Center expressly disclaims any liability for incidental or consequential damages resulting from use of this product.

Safety

Consult the Material Safety Data Sheet (MSDS) for AL-33xx materials before use. These materials are industrial products, designed for use only by qualified laboratory or production personnel.

For Special Quotes and Technical Consultations

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