

Courtesy EV Group (evgroup.com)

Addison Clear Wave Coatings Inc.
very high refractive index, high transparency
UV-curable LuxNIL[®] Resins

LuxNIL[®]

RESINS

- UV-curable Resin
- Spin-coating, Gravure Coating, Ink-jet
- Optically Clear
- Refractive index: **1.8 – 1.96** at 589 nm
- Highly transparent

ACW LUXNIL[®] Resins for Photo Nano-Imprint Lithography (P-NIL)



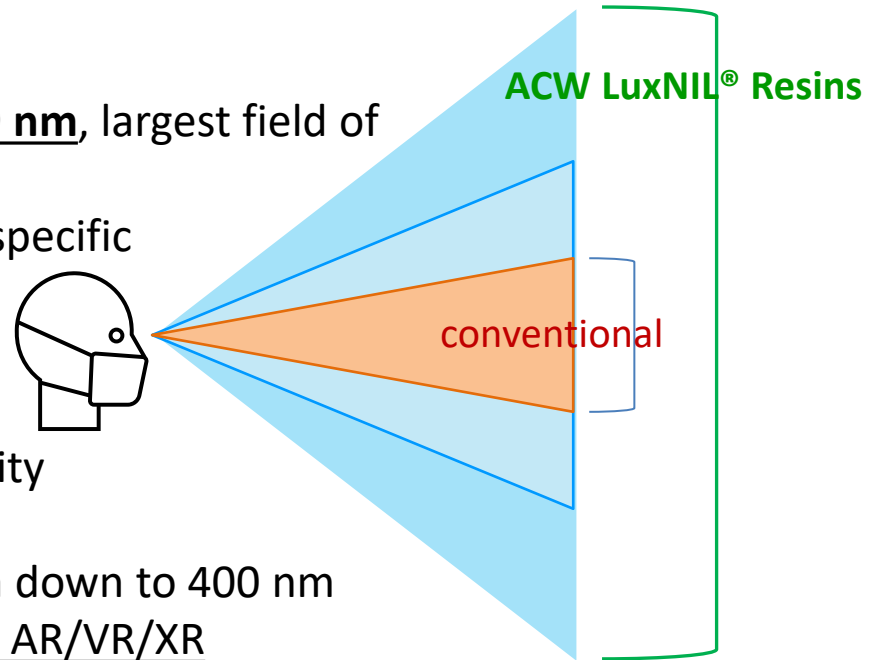
LuxNIL[®] P276, P285, and P289

AR/VR/MR Optical Waveguide

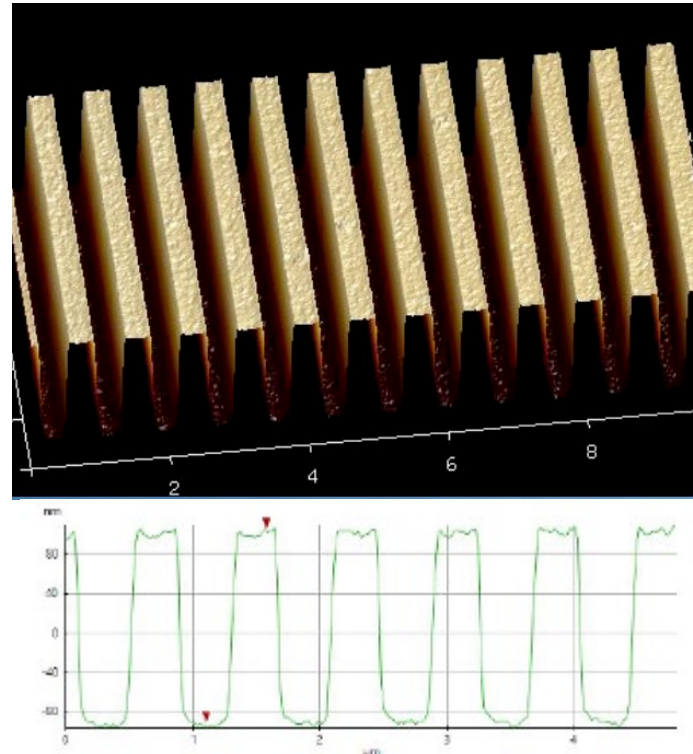
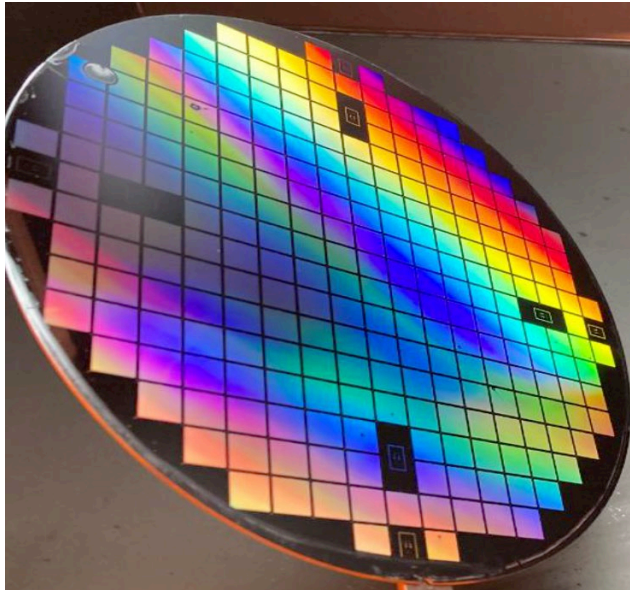
- Refractive index of 1.8 to 1.96 at 589 nm, largest field of view (FOV).
- Tunable RI to meet customer's most specific requirements

High performances of cured resin

- Good mechanical and chemical stability
- Excellent environmental stability
- Optically clear in the visible spectrum down to 400 nm
- Photo imprint of NANO FEATURES for AR/VR/XR



LuxNIL[®] Resins: Nano-Imprinting



Excellent replication of high aspect ratio nano pattern
(images are courtesy of EV GROUP, evgroup.com)

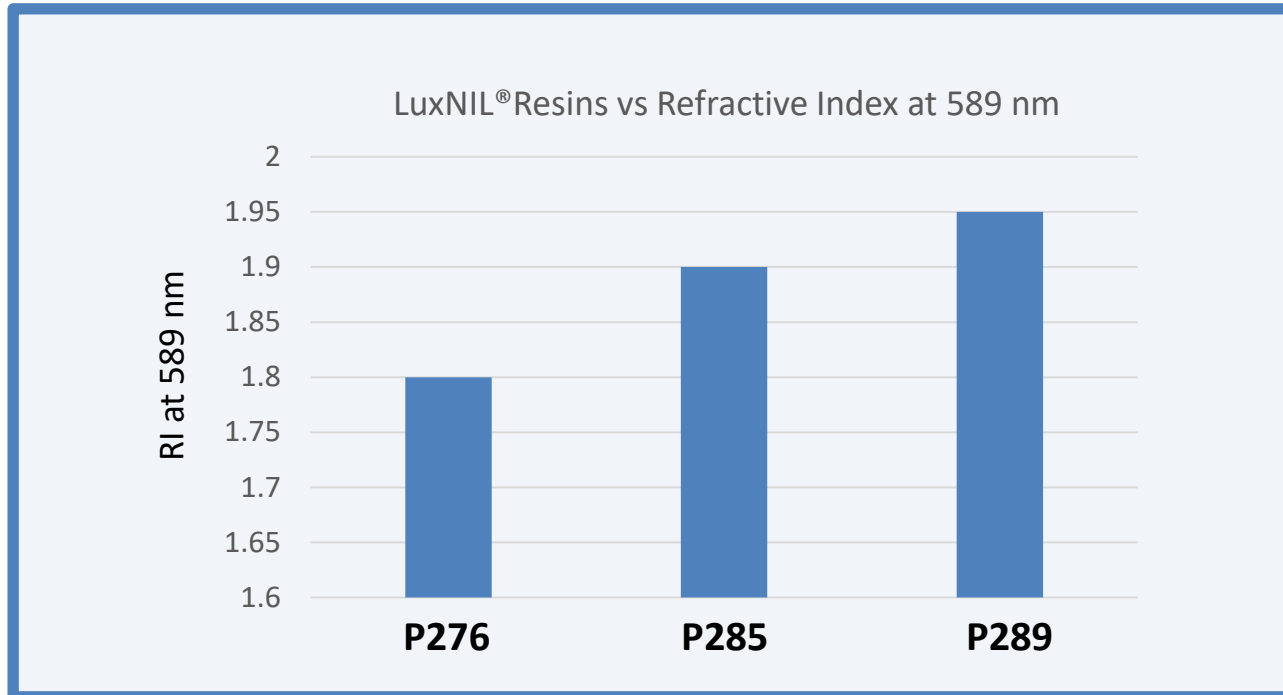


Properties of LuxNIL[®] Resins

	LuxNIL[®] RESINS
Solvent Type	PGMEA
Resin Type	Inorganic dispersion in acrylate binder
Refractive index @ 589 nm	1.8 to 1.96
Transparency	Optically clear



LuxNIL[®] Film RI at 589 nm



ACW can tune RI in the range of 1.70 to 1.96 @ 589 nm per customer's requirements. Data shown here has RI of 1.8 to 1.95 @ 589 nm



Reliability test: 85°C, 85% humidity

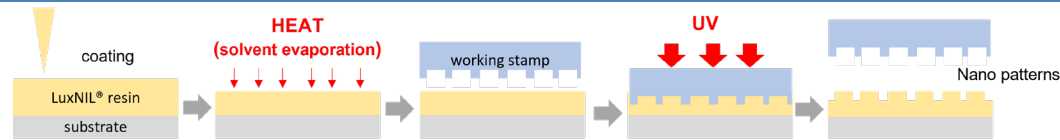
Film	Property ^b	Before Stress	After Stress
LuxNIL® P276	Refractive Index at 633 nm	1.843	1.817
	Thickness (nm)	669	670
	Haze / Clarity / Transmission ^c (%)	0.20 / 100 / 100	0.21 / 100 / 100
LuxNIL® P285	Refractive Index at 633 nm	1.918	1.918
	Thickness (nm)	698	692
	Haze / Clarity / Transmission ^c (%)	0.15 / 100 / 100	0.18 / 100 / 100
LuxNIL® P289	Refractive Index at 633 nm	1.961	1.966
	Thickness (nm)	705	693
	Haze / Clarity / Transmission ^c (%)	0.27 / 100 / 100	0.30 / 100 / 100

^aResin was coated on glass, heated at 100 °C for 1 minute to remove solvent, cured with 365 nm UV light, conditioned at 150 °C for 4 hours, and then stressed at 85 °C and 85% RH.

^bThe RI and thickness were measured on samples stressed for 360 hours. Haze, clarity, and transmission were measured on 1 micron samples stressed for 1,000 hours.

^cTransmission values are corrected for reflections.

LuxNIL[®] Resins for P-NIL Process



PROCESS:

- 1) Coating step for film forming: These resins can be applied by spin coat, roll coat, ink-jetting, etc.
- 2) Solvent removing step: after coating, heat is applied at **70 °C to 100 °C for 60 seconds** to remove PGMEA. Temperature used for solvent removal should not exceed 100°C for best fluidity for replications.
Recommended soft bake temperature of 80 °C for 60 seconds.
- 3) Nano-imprint-lithography: replication of nano features with a Working Stamp is conducted. Due to high dispersion loading for LuxNIL[®] P289 pressure or reduction in roller speed might be required for achieving good replication features.

LuxNIL[®] resins are designed for film thickness of **100 to 2,000 nm** for photo nanoimprint lithography

PRE-CURE (for solvent removal): 70 °C to 100 °C for 60 seconds

UV CURING CONDITIONS:

*Metal halide/medium or high Mercury UV: UV-A (320-400 nm), intensity: 50-1,000 mW/cm²

*or LED-365 nm, UV light intensity: 100 to 1,000 mW/cm²

RECOMMENDED UV Conditions: **LED-365 nm, 250 mW/cm² x 100 to 200 seconds.** Cure is done between 2 substrates or in an inert atmosphere.



High RI Solutions for AR, DOE, and Optics

LuxNIL[®] Resins: P276, P285, and P289

- *ACW very high refractive index products*
- *Refractive index: 1.80 to 1.96 at 589 nm*
- *Resins are now available to customers for evaluation*
- *Contact ACW for details at LuxNIL@addisoncw.com*