



Addison Clear Wave Coatings Inc.  
very high refractive index, high transparency  
UV-curable LuxNIL<sup>®</sup> Resins

**LuxNIL<sup>®</sup> RESINS**

- UV-curable Resin
- Spin-coating, Gravure Coating, Ink-jet
- Optically Clear
- Refractive index: > 1.65 at 589 nm
- Highly transparent

The background features a light blue gradient with a pattern of three-dimensional, wavy rectangular blocks and three circular shapes at the bottom, all rendered with a blue-to-white gradient and a wavy texture.

**Addison Clear Wave Introduces**

**LuxNIL<sup>®</sup> Very High RI RESINS:**

**LuxNIL<sup>®</sup> P65, P73, and P79**

## *Properties:*

|                  | <b>LuxNIL<sup>®</sup> RESINS</b>          |
|------------------|---|
| Solvent Type     | PGMEA                                     |
| Resin Type       | Inorganic dispersion with acrylate binder |
| Refractive index | 1.7 - 1.9 (405nm); 1.6 - 1.8 (589 nm)     |
| Transparency     | Optically clear                           |

# P65, P73, and P79 Characteristics

**RESIN TYPE:** UV-curable inorganic-organic dispersion in PGMEA

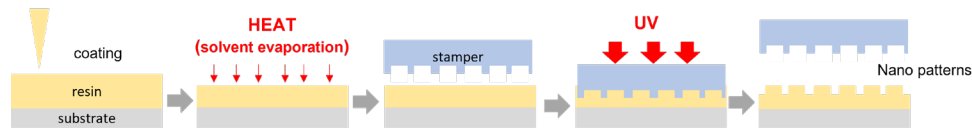
Nano-particle size: 10 nm

## APPLICATION NOTES:

### PROCESS:

- 1) Coating step for film forming: P65, P73, and P79 are used as nano imprint lithography resins. These resins can be applied by spin coat, roll coat, ink-jetting, etc.
- 2) Solvent removing step: after coating, heat is applied at 70 to 100 °C for 60 sec to remove PGMEA.
- 3) Nano-imprint-lithography: replication of nano features with a stamper is conducted
- 4) UV cure: UV cure to fix the nano features.
- 5) Stamper is removed.

**Coating thickness for P65, P73, P79 :** 100 to 3000 nm



**PRE-CURE (for solvent removal):** 70 – 100 °C for 60 sec, IR heating is acceptable

### UV CURING CONDITIONS:

\*Metal halide/medium or high Mercury UV: UV-A (320-400 nm), intensity: 50-1,000 mW/cm<sup>2</sup>

\*or LED-365 nm, UV light intensity: 100 to 1,000 mW/cm<sup>2</sup>

**RECOMMENDED UV DOSE (mJ/cm<sup>2</sup>): 750 to 2,000 mJ/cm<sup>2</sup>**



## P65, P73, and P79 precure and UV cure conditions

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|     | Precure conditions | UV dose (mJ/cm <sup>2</sup> ) |
|-----|--------------------|-------------------------------|
| P65 | 70-100 °C /60 sec  | 1,000 to 2,000                |
| P73 | 70-100 °C /60 sec  | 1,000 to 1,500                |
| P79 | 70-100 °C /60 sec  | 750 to 1,000                  |



# P65, P73, and P79 Optical Characteristics

|                                 | P65  | P73  | P79  |
|---------------------------------|------|------|------|
| Refractive Index of cured resin |      |      |      |
| @ 405 nm                        | 1.70 | 1.79 | 1.86 |
| @ 589 nm                        | 1.65 | 1.73 | 1.79 |
| Abbe No ( $V_d$ )               | 23.7 | 21.0 | 18.5 |
| Haze (%) <sup>*</sup>           | 0    | 0.05 | 0.06 |
| Transmission (%) <sup>*§</sup>  | 91.1 | 90.2 | 89.5 |
| Clarity (%) <sup>*</sup>        | 99.9 | 99.9 | 99.9 |

\*1-2 micron film on glass

§ no correction for surface reflection

# Methods

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- Samples were coated on 120  $\mu\text{m}$  borosilicate glass, soft heated at 100  $^{\circ}\text{C}$  for 60 seconds, and cured with 0.7 to 2  $\text{J}/\text{cm}^2$  of UV-A light.
- Refractive index and film thickness were measured on a prism coupler at 25  $^{\circ}\text{C}$ 
  - Wavelengths were 457, 516, 638, 854 nm
  - The data was solved as a Cauchy function
- % Transmission, haze, and clarity were measured for the thin films coated on glass

# Environmental Stress

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- The samples of P65, P73 and P79 coated on borosilicate glass were placed in an environmental stress chamber at 85 °C and 85% relative humidity.
- The samples were open to the atmosphere.
- After 1,100 hours, the samples were analyzed for RI, % transmission, haze, and clarity.
- Experimental data follows.



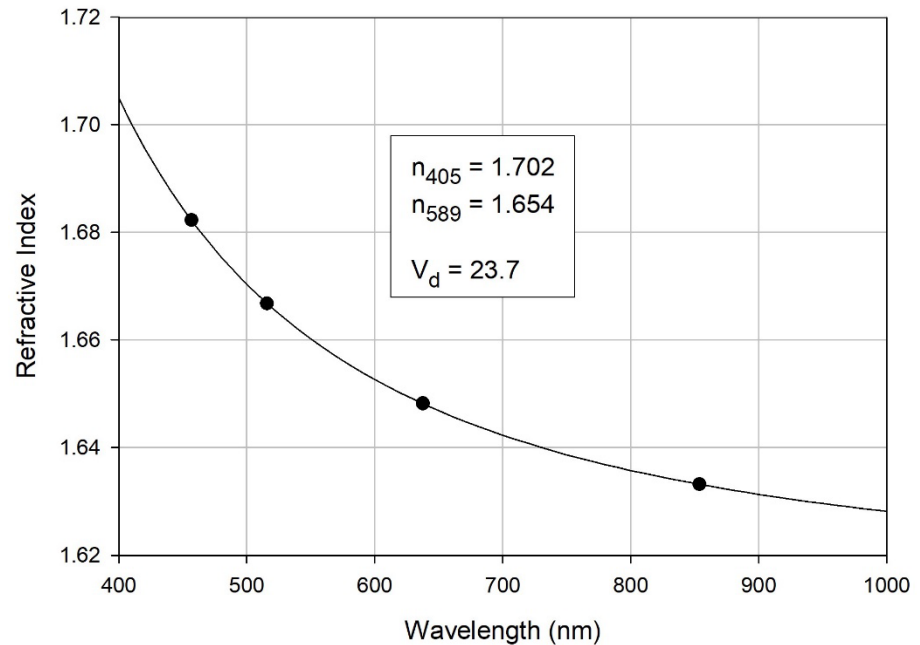
# LuxNIL<sup>®</sup> P65



| Property      | Time Zero | 1,100 hours at 85°C/85%RH |
|---------------|-----------|---------------------------|
| $n_{405}$     | 1.702     | 1.728                     |
| $n_{589}$     | 1.654     | 1.669                     |
| Transmission* | 91.1%     | 89.0%                     |
| Haze*         | 0.0%      | 0.5%                      |
| Clarity*      | 99.9%     | 99.9%                     |

\*1.4 micron film on borosilicate glass.  
No correction for surface reflection

LuxNIL P65 on glass, 1.4 micron



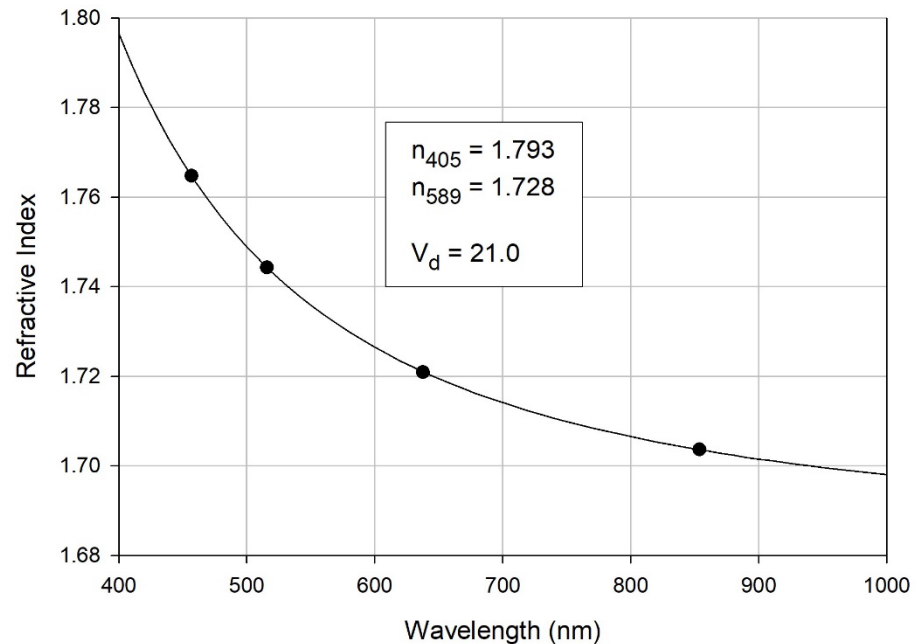
# LuxNIL<sup>®</sup> P73



| Property      | Time Zero | 1,100 hours at 85°C/85%RH |
|---------------|-----------|---------------------------|
| $n_{405}$     | 1.793     | 1.858                     |
| $n_{589}$     | 1.728     | 1.773                     |
| Transmission* | 90.2%     | 88.4%                     |
| Haze*         | 0.0%      | 0.5%                      |
| Clarity*      | 99.9%     | 99.8%                     |

\*1.0 micron film on borosilicate glass.  
No correction for surface reflection

LuxNIL P73 on glass, 1.0 micron



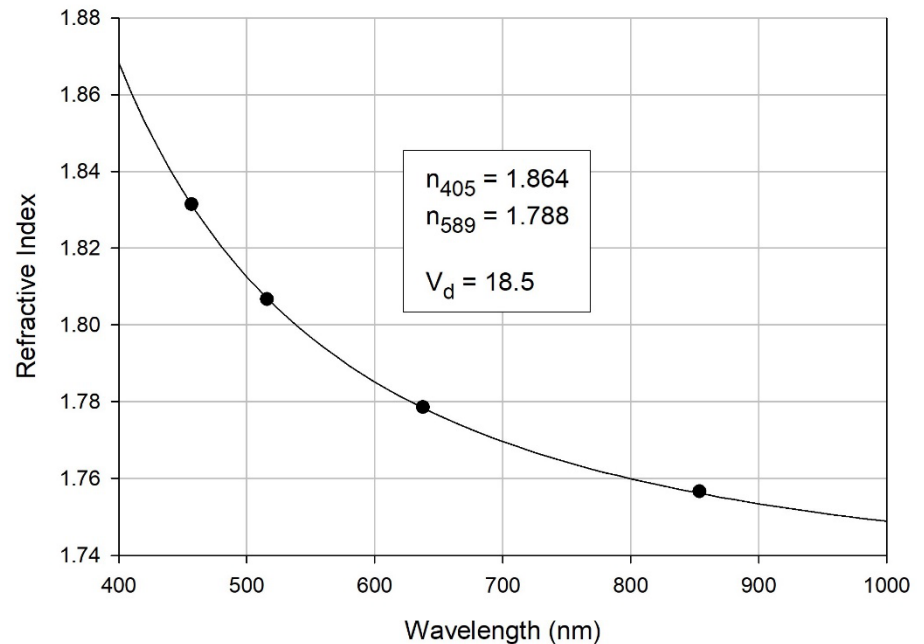
# LuxNIL<sup>®</sup> P79



| Property      | Time Zero | 1,100 hours at 85°C/85%RH |
|---------------|-----------|---------------------------|
| $n_{405}$     | 1.864     | 1.908                     |
| $n_{589}$     | 1.788     | 1.824                     |
| Transmission* | 89.5%     | 87.9%                     |
| Haze*         | 0.1%      | 0.5%                      |
| Clarity*      | 99.9%     | 99.9%                     |

\*1.8 micron film on borosilicate glass.  
No correction for surface reflection

LuxNIL P79 on glass, 1.8 micron



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## **LuxNIL<sup>®</sup> Resins:**

- *ACW very high refractive index products*
- *Refractive index: 1.6 to 1.8 at 589 nm*
- *Samples now available to customers*
- *Contact ACW at [LuxNIL@addisoncw.com](mailto:LuxNIL@addisoncw.com)*