High Refractive Index UV Nanoimprint Material

NL-N93X

Nanoimprint Resin for
Meta-Optics, Photonics and Diffractive Structures

NL-N93X is a UV-curable nanoimprint material designed for fabrication of **high-index optical nanostructures**. The material is based on a TiO_2 nanocomposite system enabling refractive index around **1.93** while maintaining nanoimprint process compatibility. The material is suitable for **meta-optics**, **diffractive optical elements**, and **advanced photonics structures**.

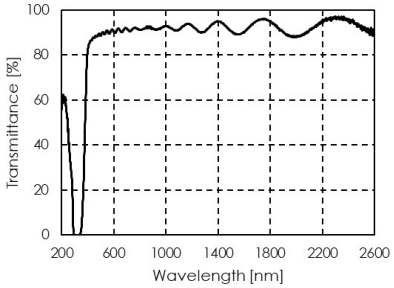
Target Applications

- **Meta-lens** and **meta-surface** fabrication
- Diffractive optical elements (**DOE**)
- **Silicon photonics** structures
- **AR / XR** optical components
- High-index nanostructures fabricated by UV nanoimprint

Property

Refractive index	**1.93** @589 nm
Filler	TiO_2(rutile) particles
Particle size	~10 nm (average)
Filler loading	**~65 vol%**
Shrinkage (linear)	**~3%**
Coating method	Spin coating
Typical film thickness	~ **50 nm** – ~**1 μm**
UV curing wavelength	**365** / **385** / **405** nm
Recommended mold	Hard epoxy replica
Total transmittance	**94%** (1μm film)
Haze	< **0.1%** (1μm film)

Optical transmission (approx. 2μm film)



Process

Spin coat → Bake → Imprint → UV cure → Demold → Structure

Minimum feature size demonstrated: 100 nm

Processing Notes

Hard replica molds (e.g., epoxy molds) are recommended due to the high inorganic filler loading. Soft molds such as PDMS may deform or cause demolding issues depending on pattern geometry.

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