

PixClear® nanocrystal dispersions enable superior performance in optical components, from crystal-clear images to scratch-proof screens, and revolutionize light management in display and light applications. Our Zirconia nanocrystal dispersions offer a unique combination of high refractive index, high transparency (%T > 95%) and low haze (< 0.5%), along with thermal and mechanical lifetime stability. They are now available in low boiling point ethyl acetate, for ease of integration with customer manufacturing processes.

Our materials increase hardness and decrease haze, for durable coatings in display applications, while raising the RI to match other components. PixClear® products also deliver performance benefits to image sensor lenses, optical adhesives, fiber optics, transparent dielectrics, and other optical components.

PixClear® zirconia nanocrystals are tailored to be dispersible in a wide variety of monomers, and polymers. Pixelligent's patent pending synthesis and surface modification technologies produce high quality dispersions that are easily incorporated into many of the most widely used polymer systems. This results in better end-product performance and enables formulations with nanocrystal loading in excess of 80 wt% to reach a refractive index as high as 1.85. This added benefit translates into greater flexibility to index match dissimilar materials, and compatibility with modern high-speed polymer film forming techniques.

### PixClear® Dispersion Specifications

Solvent	Nanocrystal	Boiling Point (C)	Functional Capping	Nonfunctional Capping
ETA	PR	77.1	✓	
	PB-2		✓	
	PG-2			✓
	PN			✓
PGA	PR	145.8	✓	
	PB-2		✓	
	PG-2			✓
	PN			✓

### Features

- ZrO<sub>2</sub> Nanocrystal Size: 5nm
- ZrO<sub>2</sub> Nanocrystal Shape: Spherical
- High Refractive Index

### Benefits

- Haze less than 0.5%
- Hardness up to 9H for durable-coating applications
- Dielectric performance improvement with high transparency
- Stability and Reliability for thermal reflow conditions and long-term reliability

### Compatibility

Our nanocrystal surface modification process enables compatibility with commonly used solvents, monomers and polymers.

- Solvents: PGMEA, PGME, Ethyl Acetate, Ethanol, Xylenes, Heptanes, and more
- Monomers and Polymers: Acrylics, Epoxies, Siloxanes, Silicones, Urethane Acrylates, and Hybrid Polymers

### Manufacturability

Low viscosity allows integration into existing manufacturing processes.

- Coating Methods: Spin Coating, Slot Die, Wire-rod, Thermal Curing, UV Curing
- Substrate Types: Glass or Flexible Substrates such as PET, Poly-carbonate, etc.

PixClear® dispersions are available as a 4-pack, which includes four nanocrystal dispersions in ETA, for first time users. With unique capping agents, the 50wt% 4-pack offers flexibility to determine which nanocrystal will produce the best results in an application of interest. The PR and PB-2 dispersions in ETA are designed to crosslink with acrylics when cured, and are compatible with many other polymers.

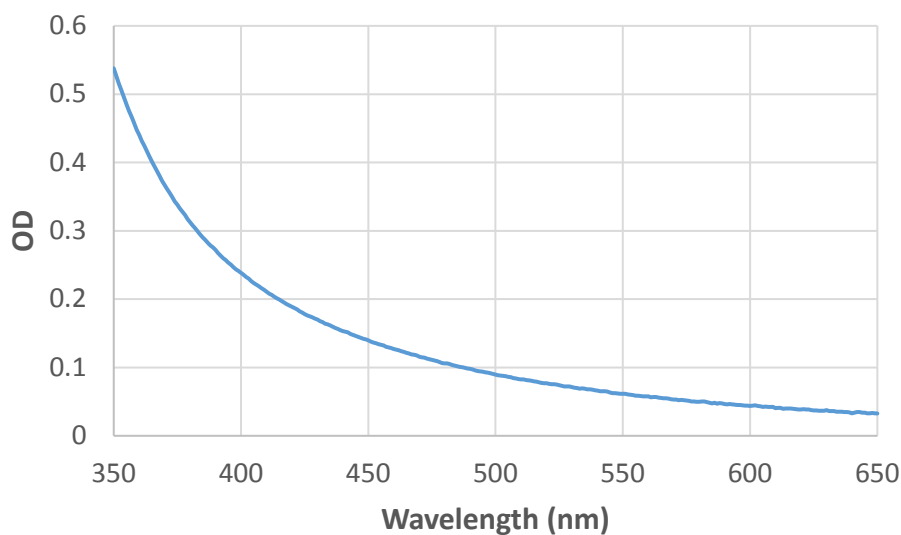
## PixClear®

### Typical Physical Properties

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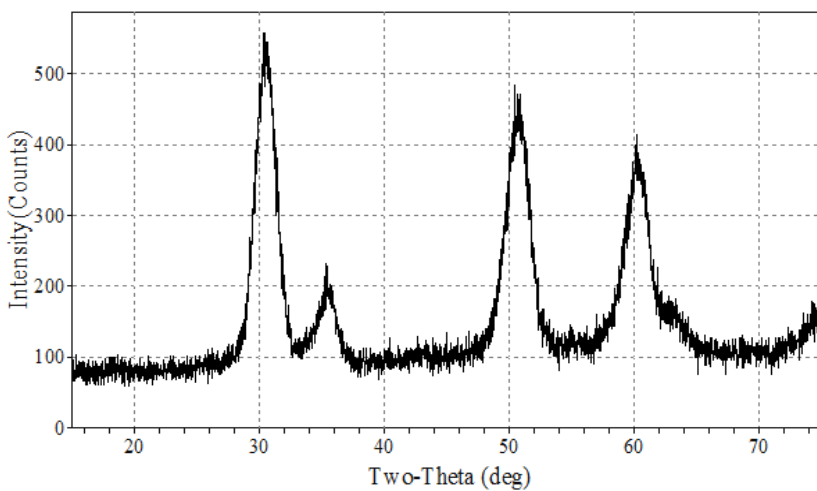
#### UV-Vis Spectrum

A typical UV-Vis spectrum of PixClear® shows low absorbance and scattering in the suspension through a 1 cm path length in solvent.



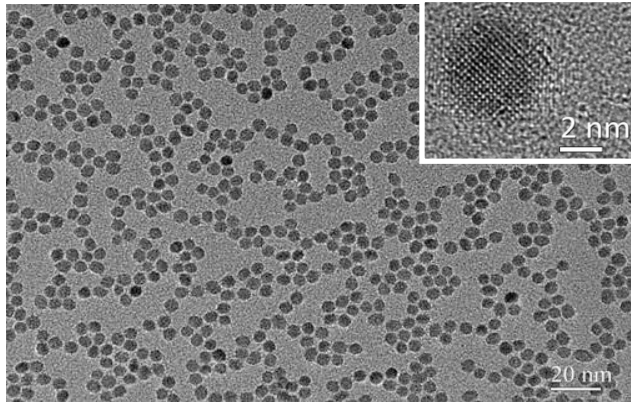
#### XRD Pattern

A typical XRD pattern shows highly crystalline particles.



### Particle Size

A typical TEM image of PixClear® shows spherical nanocrystals with 5 nm size and narrow size distribution.



### Particle Size Distribution

The dispersions are aggregate free with 99.99% (by volume) of the zirconia contained in nanocrystals with a diameter < 30 nm as measured by Dynamic Light Scattering (DLS).

