

# YbF<sub>3</sub>



## Characteristics

Typical values	YbF <sub>3</sub> nano-dispersions
Chemical formula	YbF <sub>3</sub>
Crystal structure	Orthorhombic
Average Particle Size (nm)	20, 40 & 60
Density* (g/cm <sup>3</sup> )	8.2
Refractive index*	1.53
Dispersion solid content (wt.%) <i>Depending on dispersion medium</i>	Up to 70

\*Theoretical

Nano-dispersion Characteristics	Example 1	Example 2
Nanoparticles	YbF <sub>3</sub>	YbF <sub>3</sub>
Monomer	UDMA	TEGDMA
Solid content (wt.%)	30	50
Viscosity (Pa.s)	50	6.9
Shear rate (s <sup>-1</sup> )	1	1

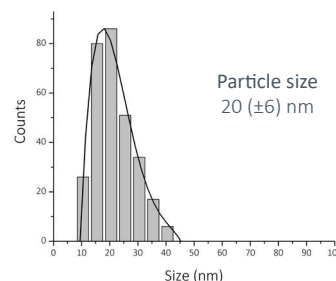
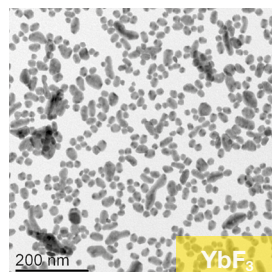
> YbF<sub>3</sub> nanoparticles in suspension  
**main benefits:**

- High translucency of dental composites
- Higher depth of cure
- Low viscosity at high particle loading
- Improved flexural strength
- Higher filler load

*The type of functionalization provided strongly depends on dispersion medium & application requirements.*

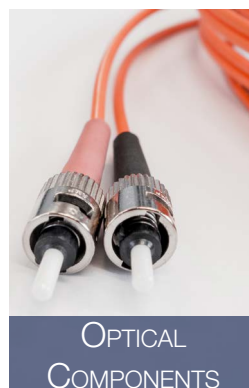


> Example of **particle morphology & size distribution** - YbF<sub>3</sub>



## Applications

> Our dispersions contain the **smallest YbF<sub>3</sub> nanoparticles** on the market and exhibit the **highest available solid contents**. We advise to use these products as **radiopacifying fillers** in dental composites. They are **compatible with all dental monomers**. YbF<sub>3</sub> nanoparticles can also be used for the manufacturing of **optical components**.



### PRODUCT DESIGN

Our nano-dispersions are available dispersed in a variety of solvents & resins:

- Water
- Alcohol
- Polyol
- Acetone
- Methacrylate-based dental resin
- Custom solvent



# ZrO<sub>2</sub> / YSZ

## Characteristics

Nano-dispersions (Typical values)	ZrO <sub>2</sub>	YSZ
Chemical formula	ZrO <sub>2</sub>	ZrO <sub>2</sub> - 1 to 10 mol% Y <sub>2</sub> O <sub>3</sub>
Crystal structure	Monoclinic or tetragonal	Tetragonal <sup>(1)</sup>
Morphology	Nearly spherical, needle-like, square bundles	Nearly spherical <sup>(2)</sup>
Average Particle Size (nm)	3 - 90	5 - 20
Density* (g/cm <sup>3</sup> )	5.7 (Monoclinic ZrO <sub>2</sub> )	6.1 (3YSZ)
Refractive index	≥ 2.14	≥ 2.10
Dispersion solid content (wt.%) <i>Depending on dispersion medium</i>	Up to 70	Up to 70
Sintering temperature (°C)	-	950 - 1200

\*Theoretical

<sup>(1)</sup> <sup>(2)</sup> Some grades contain a small fraction of:

<sup>(1)</sup> monoclinic particles

<sup>(2)</sup> anisotropic particles

➤ Doped and undoped Zirconia nanoparticles in suspension  
**main benefits:**

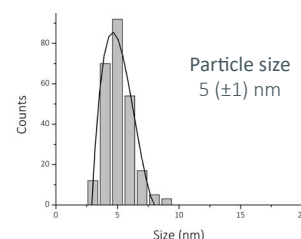
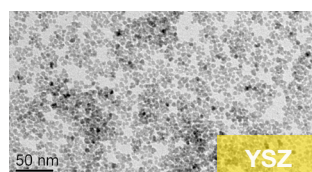
- Smallest nanoparticles on the market
- High transparency nanocomposites
- Low viscosity at high particle loading

*The **type of functionalization** provided strongly depends on dispersion medium & application requirements.*

➤ Final ceramics made with YSZ nanoparticles in suspension  
**main characteristics:**

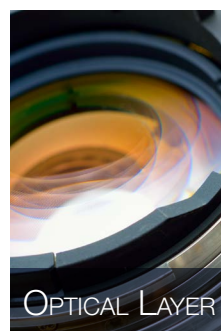
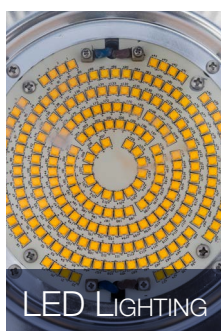
- Sintered at low temperature
- Fine-grained
- Highly translucent

➤ Example of **particle morphology & size distribution - YSZ**



## Applications

➤ Our dispersions are designed to **enhance optical, thermal and mechanical performances** of your material. Our nanozirconia shows a **very high refractive index**, which is your best ally in the design of high-end optical materials. It will be your favorite nanofiller for encapsulation materials, **improving visible LED devices**. It can also be used as a **sintering additive** for high-end ceramics, or as an **optical coating** for display materials.



### PRODUCT DESIGN

Our nano-dispersions are available dispersed in various solvents & resins:

- Water, alcohol, polyol, acetone, MEK
- Selected organic solvents
- Methacrylate-based dental resin
- Silicone oils, customer specific monomer mixture, e.g.: epoxy & fluorene (under development)



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