

Water Dispersible Upconverting Nanoparticles

Technical Details

Description

Upconverting nanoparticles (UCNs) are a novel group of fluorophores which are steadily gaining popularity in the scientific community. The upconversion luminescence arises from a phenomenon whereby light of low energy, usually in the NIR region, is converted to light of higher energy in the shorter wavelength range. Because the mechanism of upconversion fluorescence involves emitting higher energy photons after sequential discrete absorption of two or more lower-energy photons, it is more efficient than conventional simultaneous two-photon absorption, with no requirement for coherent light sources and higher excitation energies. Thus, this permits the use of inexpensive and readily available continuous wave (CW) laser diode.

Using a NIR excitation source prevents auto-fluorescence from biological samples used in analysis. UCNs are also highly photostable and thus suitable for long-term imaging applications. UCNs have been used in a wide range of applications including but not limited to in vitro imaging, in vivo imaging, diagnostic assays, immunohistochemistry, FRET, microarrays, photodynamic therapy and photoactivation.

This series of products contains ligand-free NaYREF₄ (RE:Yb, Er, Tm, Gd, Mn, Lu) UCNs, with upconversion emission optimized at different wavelengths. The oleates have been removed from the nanoparticle surface through treatment with diluted hydrochloric acid, rendering UCNs dispersible directly in water and ethanol. The size of UCNs can be customized based on user's need.

Characteristics

Excitation maxima: 975 nm

Sensitizer: Yb³⁺

Activators: Tm³⁺/Er³⁺

Diameter: 25 nm

Appearance: White, crystalline solid

Storage temperature: 4-8 °C

Product number	Emission wavelength	Crystal formula	Shape
DNL-B006	365 nm	NaYREF ₄ , RE:Yb, Er, Tm, Gd, Mn, Lu	Spherical
DNL-B007	475 nm	NaYREF ₄ , RE:Yb, Er, Tm, Gd, Mn, Lu	Spherical
DNL-B008	545 nm	NaYREF ₄ , RE:Yb, Er, Tm, Gd, Mn, Lu	Spherical
DNL-B009	660 nm	NaYREF ₄ , RE:Yb, Er, Tm, Gd, Mn, Lu	Spherical
DNL-B010	804 nm	NaYREF ₄ , RE:Yb, Er, Tm, Gd, Mn, Lu	Spherical

Figure 1: Transmission electron micrographs

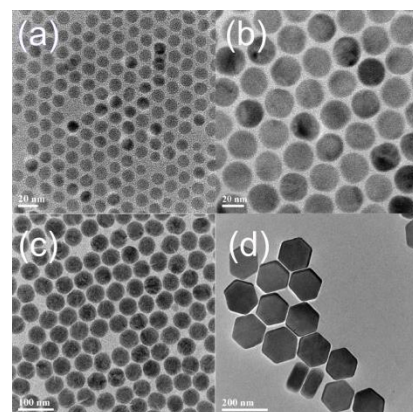


Figure 2: Size distribution from dynamic light scattering measurement

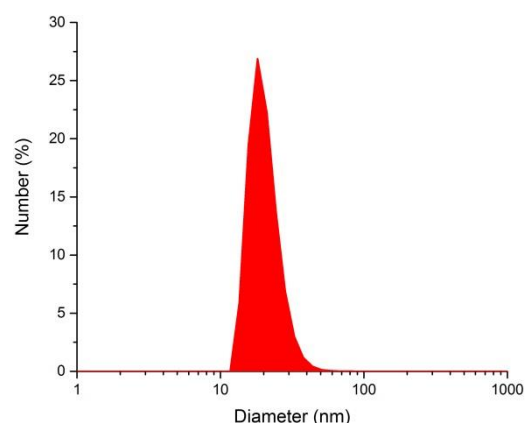
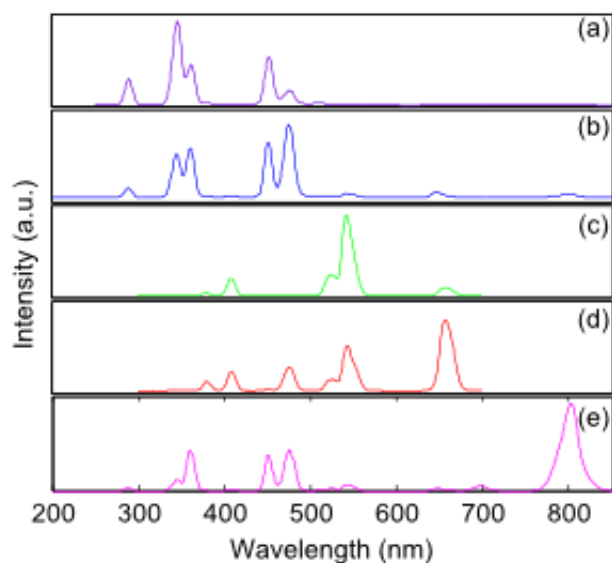


Figure 3: Upconversion emission spectra upon excitation at 975 nm: (a) DNL-B006; (b) DNL-B007; (c) DNL-B008; (d) DNL-B009; (e) DNL-B010.



Sample preparation advice

Upconverting nanoparticles can be reconstituted directly in water or aqueous media as per the concentration required. After reconstitution, the nanoparticles should be vortexed and sonicated for 3 min prior to use.

Disclaimer

This product is for research use only. They should not be used for any animal or human diagnostic/therapeutic purposes or for other uses.

References

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