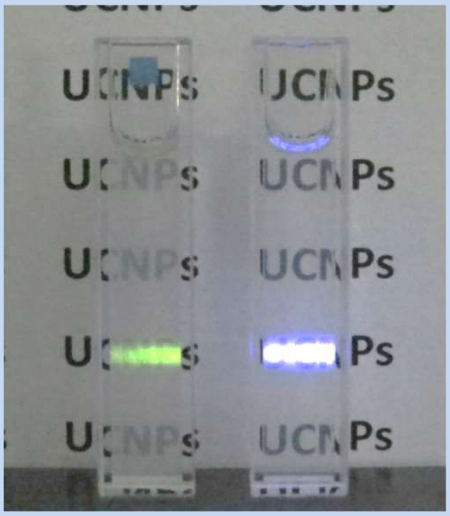
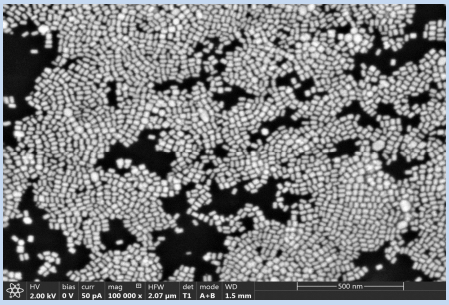
TE LINTELO SYSTEMS BV
photonics is our passion!

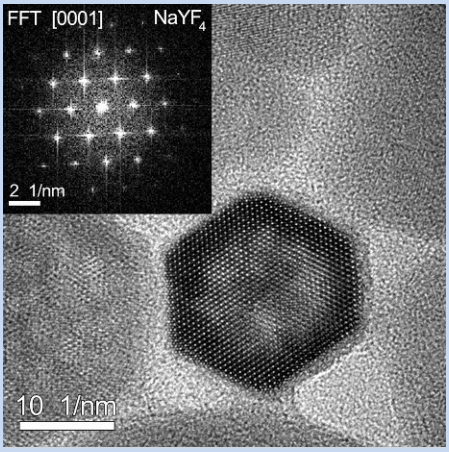
UP- AND DOWN- CONVERSION NANOPARTICLES



Anti-stokes fluorescence image upon excitation at 975 nm of TLS upconversion nanoparticles. A left cuvette filled with - NaYF4:Yb3+,Er3+/NaYF4 and a right cuvette filled with β-NaYF4:Yb3+,Tm3+/NaYF4 demonstrate uniform green and UV/blue emission, respectively.



SEM image of upconversion nanoparticles with hexagonal prism shape.



TEM image of upconversion nanoparticle with hexagonal prism shape.

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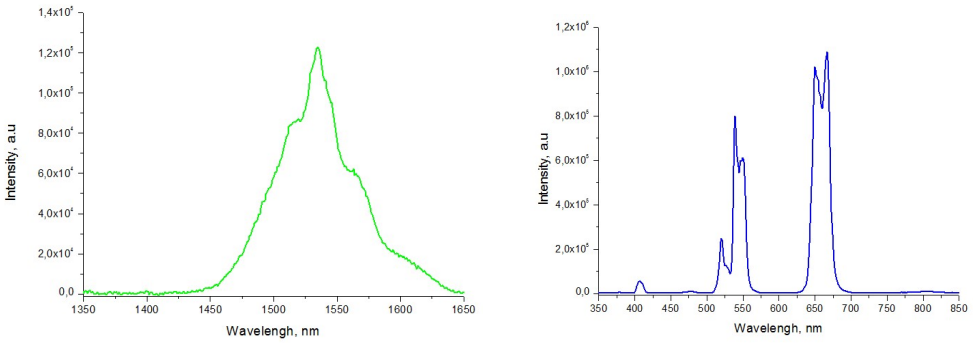
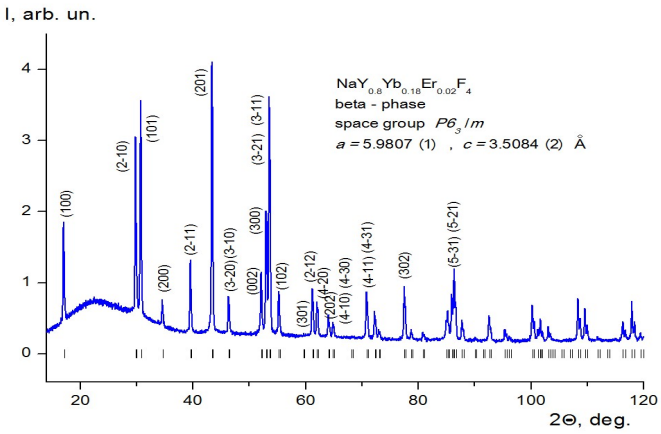
Up- and down-conversion nanoparticles are inorganic nanocrystals capable of converting near-infrared radiation to emission with large Stokes and/or anti-stokes shift. The upconversion photoluminescence mechanism includes the sequential absorption of several excitation photons through the long lifetime and ladder-like energy levels of trivalent lanthanide ions (ytterbium, erbium or thulium) embedded in an inorganic host matrix. The most efficient host matrix of UCNPs is $NaYF_4$ codoped with Yb^{3+}, as a sensitizer, and Er^{3+} or Tm^{3+}, as an activator. The luminescence of Lanthanide-doped nanoparticles is very stable without photobleaching and photoblinking issues. **T**he overwhelming majority of the conversion nanoparticles prominent applications have originated from their unique luminescent properties. Today inorganic up- and down-conversion nanoparticles attract the interest in numerous fields, such as biomedical imaging, therapy agents, anti-counterfeit labels, 3D printing, information technology, solar cells, et al.



Stokes (left panel) and anti-Stokes (right panel) luminescent Spectrum of TLS upconversion nanoparticles with core/shell structure ß-NaYF4:Yb3+,Er3+/NaYF4 irradiated with 975 nm laser light.



XRD pattern for TLS upconversion nanoparticles.

Product specification:

Composition	Up- and down- conversion nanoparticles	
Diameter	narrow dispersion 10-20 nm, 30-50 nm	polydisperse 10-100 nm
Appearance	from clear to white solution	
Crystal formula	NaYREF4, NaLaREF4 (RE: Yb, Er, Tm, Gd, Mn, Lu, Ce)	
Solvent	organic solvent or water	
Excitation wavelength	970-980 nm	
Sensitizer	Ytterbium (Yb3+)	
Activator	Stokes emission	Anti-Stokes emission
Thulium (Tm3+)	1700 nm	365/475/800 nm
Erbium (Er3+)	1530 nm	545/660 nm
Packaging	10 mg/mL in organic solvent in glass bottle, 1 – 10 mL	