

How can energy migration enhance Nd<sup>3+</sup>-sensitized upconversion and downshifting luminescence dynamics?

The use of such energy migration can effectively enhance Nd<sup>3+</sup>-sensitized upconversion and mediate upconversion and downshifting luminescence dynamics with tuning of the rise and decay times<sup>7,36,37</sup>.

Why is energy migration important?

Energy migration is an essential process in numerous systems, such as natural photosynthetic proteins, artificial polymers, and inorganic optical materials<sup>1,2,3</sup>.

Which structure produces maximum upconversion luminescence?

The outside-in architecture produces the maximum upconversion luminescence, around 6-times brighter than that of the inside-out at the single-particle level. Monte Carlo simulation suggests a topology-dependent energy migration favoring the upconversion luminescence of outside-in structure.

Does excitation energy affect the luminescence time behavior of nanostructures?

Recent research shows that this does not hold for nanostructures. The luminescence time behavior in the nanomaterials is confirmed seriously affected by the migration process of the excitation energy. This new fundamental insight is significant for the design of functional upconversion nanostructures.

Does topological arrangement enhance upconversion luminescence?

Here, we report an inorganic optical nanosystem composed of NaErF<sub>4</sub> and NaYbF<sub>4</sub>, in which topological arrangement enhanced upconversion luminescence. Three architectures are designed for considerations pertaining to energy migration and energy transfer within nanoparticles: outside-in, inside-out, and local energy transfer.

Can lanthanide emitters produce upconversion luminescence through energy migration?

Nature Communications 12, Article number: 3704 (2021) Cite this article Exploration of upconversion luminescence from lanthanide emitters through energy migration has profound implications for fundamental research and technology development.

With the technological progress in modern society, new type applications such as temperature sensors and bio-imaging have been put forward for lanthanide-doped luminescent materials [5,6].

Fast response, high luminescence contrast, three-dimensional (3D) storage, and nondestructive reading are key factors for the optical storage application of photochromic materials. Femtosecond (fs) laser direct writing technology with multiphoton nonlinear absorption is becoming a useful tool for microprocessing functional units in the 3D space of glass owing ...

a Scheme for the energy migration process in the nanoparticles upon changing excitation wavelength ( $\lambda$ ), pulse frequency ( $f$ ), and laser power ( $P$ ).b Energy absorption of 808 nm at the outmost layer ...

Thus, combined with the spectral results, the following energy transfer model can be deduced: the efficiency of nonradiative energy migration is low, and the energy is mainly used to emit through ...

The interlocked network successfully restricted the rotation of the phenyl units, which are the major cause of fluorescence deactivation in TPE, thus providing intrinsic luminescence activity for the polymers, and positive ‘CMP effects’ that the network promotes p-conjugation, facilitates exciton migration, and improves luminescent activity. Herein we report ...

Based on luminescence properties, decay times and thermal properties, the interesting phenomenon with excitation energy increasing from UV to electron beam can be reasonably explained by a ...

The findings reveal that long-distance energy transportation can occur in the  $\text{Ho}^{3+}$  sublattice owing to the energy migration capability of  $\text{Ho}^{3+}$  and that  $\text{Ho}^{3+}$  as a bridge ion can realize ...

Luminescence and energy storage characteristics of coke-based graphite oxide. ... Higher crystallinity of precursors is a mandatory criterion to derive the finest graphene-based nanoparticle. Therefore, coke which is known to be the highest quality coal turns out to be an efficient precursor as it holds higher carbon content and fewer ...

Ultrafine composite fibers consisting of a thermoplastic polyurethane solid-solid phase-change material and organic lanthanide luminescent materials were prepared through a parallel ...

Major components of UCNPs are host matrix, sensitizer (absorber) and activator (Fig. 1). In general, the host matrix should meet four requirements: (1) it should be able to endure the presence of bright centers without difficulty; (2) it should have modest phonon energy to avoid non-radiative relaxations that are dangerous; (3) for free NIR photon ...

The upconversion luminescence is based on the energy transfer between metal and ... the enhancement of the emission intensity but also the characteristic energy migration luminescence, temperature ...

Notably, energy migration among  $\text{Er}^{3+}$  ions in the core region cannot be taken into consideration (Supplementary Fig. 18), although it is a primary origin of the energy loss for an erbium-based ...

Given that  $\text{Gd}^{3+}$ -based energy migration suffers from luminescence quenching caused by the vibration of surrounding solvent molecules, we tested the optical stability of ...

Energy migration is an essential process in numerous systems, such as natural photosynthetic proteins, artificial polymers, and inorganic optical materials <sup>1,2,3</sup> particular, in lanthanide-doped ...

Photochromism and photoluminescence are two interesting optical phenomena, and their combination in a single material can present some novel applications as multiple anti-counterfeiting and optical memory devices. However, a challenge exists in the exploitation of materials with both photochromism and photoluminescence upon double-light stimulation. ...

Lanthanide-doped metal-organic frameworks (Ln-MOFs) have versatile luminescence properties, however it is challenging to achieve lanthanide-based upconversion luminescence in these materials.

Optical storage based on photostimulated luminescence (PSL) shows significant advantages and is considered one of the most promising next-generation advanced storage technologies. ... Visible to near-infrared persistent luminescence and mechanoluminescence from Pr<sup>3+</sup> doped LiGa<sub>5</sub>O<sub>8</sub> for energy storage and bioimaging. Adv. Opt. Mater., 7 (2019) ...

Request PDF | On Apr 6, 2018, Tao Wang and others published 808 nm Excited Multicolor Up-Conversion Tuning Through Energy Migration in Core-Shell-Shell Nanoarchitecture | Find, read and cite all ...

For the thermally stimulated storage phosphors the energy is released upon heating based on the principle of thermoluminescence (TL). They have found a lot of industrial applications in the fields of dosimetry, X-ray imaging and as the self-sustained night-vision luminescent materials due to the environmentally friendly nature and economical ...

It is derived that the conventional Förster formalism applied to the estimation of energy transfer efficiency in UCNP-fluorophore pairs can provide misleading results. The mechanism of upconversion at the nanoscale is still under discussion. In this paper, we report on the experimental results of anti-Stokes luminescence kinetics in the upconversion ...

The ability to tune upconversion properties by combining energy migration and core-shell structural engineering could expand the range of applications for lanthanide-doped ...

Optically stimulated luminescence (OSL) materials, enabling energy storage by capturing of charge carriers and then the energy conversion to light via photostimulation, can find many advanced ...

Engineering the compositional architecture of core-shell upconverting lanthanide-doped nanoparticles for optimal luminescent donor in resonance energy transfer: ...

Förster Resonance Energy Transfer (FRET) between single molecule donor (D) and acceptor (A) is well understood from a fundamental perspective and is widely applied in biology, biotechnology, medical

diagnostics, and bio-imaging. Lanthanide doped upconverting nanoparticles (UCNPs) have demonstrated t ...

In this study, we fabricate a novel multifunctional ceramic with luminescence and energy storage properties, which can be denoted as  $(1-x)\text{Bi}_{0.5}\text{Na}_{0.5}\text{TiO}_{3-x}\text{Sr}_{0.7}\text{Sm}_{0.2}$  ...

DOI: 10.1016/j.jlumin.2023.119814 Corpus ID: 257612855; Luminescence and energy-storage properties of  $\text{Pr}^{3+}$ -doped  $\text{YAlO}_3$  crystals @article{Gieszczyk2023LuminescenceAE, title={Luminescence and energy-storage properties of  $\text{Pr}^{3+}$ -doped  $\text{YAlO}_3$  crystals}, author={Wojciech Gieszczyk and Anna Mrozik and P. Bilski and Yu. V. Zorenko and Sandra ...

The microscopic energy transfer parameters for donor-acceptor energy transfer,  $C_{DA}$ , and donor-donor energy migration,  $C_{DD}$ , have been obtained from the theoretical fittings to experimental decay ...

A novel mechanistic strategy for probing the energy migration through constructing the interfacial energy transfer (IET) in a core-shell-shell nanostructure is reported, and the results show that the Gd sublattice holds the best energy migratory performance. A novel mechanistic strategy for probing the energy migration through constructing the interfacial ...

In recently, several physicochemical modifications were devoted to develop FG-based materials with novel characteristic for application in electric conductivity, color, luminescence, and sensor ...

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