

What is fluorescent thermometry?

Fluorescent thermometry involves the use of a fluorescent dye, whose fluorescence intensity is a strong function of temperature, to infer the temperature of a fluid or surface. The dye is dissolved in a fluid of interest, or coated on a surface, and is excited to fluoresce by incident light.

What is the difference between photoluminescence and fluorescence thermometry?

Photoluminescence; Temperature measurement using fluorescence. Fluorescent thermometry involves the use of a fluorescent dye, whose fluorescence intensity is a strong function of temperature, to infer the temperature of a fluid or surface.

What is fluorescent resonance energy transfer (FRET)?

11. Fluorescence resonance energy transfer (FRET) is a mechanism of energy transfer between two fluorescent molecules that can cause errors in temperature measurement, especially at higher concentrations.

What is a fluorescence lifetime?

The fluorescence lifetime, is an inherent property that is independent from the laser intensity fluctuations and depends on the fluorescent molecules temperature given by: (11) where is the activation energy, the global gas constant, and is a coefficient.

What is the difference between surface temperature measurement and fluorescence measurement?

In the case of fluid temperature measurement, the fluid in a plane of interest is illuminated with incident light (typically a sheet of laser light) and the dye is excited to fluoresce. In the case of surface temperature measurement by fluorescence, the surface coated with the dye would be illuminated with incident light.

What is lifetime Fluorescence imaging microscopy (FLIM)?

Unlike the other LIF measurement techniques that utilize the relative intensity for temperature demonstration, lifetime fluorescence imaging microscopy (FLIM) is an absolute measurement method for temperature mapping with applications in biology and fluid mechanics .

This paper puts forward a kind of optical fiber temperature sensor based on fluorescence lifetime, which can be applied to measurement in strong electromagnetic, strong corrosion and other harsh environment. A small volume, long service life, strong anti-jamming capability of fluorescence temperature sensor was designed by matching rare earth fluorescent ...

temperature deduced from fluorescence spectra yields a true resin temperature. Employing fluorescent dyes as temperature probes has been the subject of a number of studies (5-17). Both time resolved and steady state fluorescence measurements have been employed. Many researchers have used excimer producing fluorescent

dyes, such as

Based on their advantages of fast response, high sensitivity, simple operation, high spatial resolution, and non-destructive detection, fluorescence thermometers have become powerful analysis tools used to sense temperature fluctuations through fluorescent signals, especially to accurately capture living cells via fluorescent signals and local temperature ...

Additionally, the dielectric temperature stability also results in splendid storage temperature stability ( $\Delta W_{rec}/W_{rec}$  3.1% in the range of 0-200°C). Importantly, codoping Ho/Yb ...

Additionally, the dielectric temperature stability also results in splendid storage temperature stability ( $\Delta W_{rec}/W_{rec}$  < 3.1 % in the range of 0-200 °C). Importantly, codoping ...

Download Citation | On Jul 1, 2024, Xiangfu Zeng and others published Excellent low-E energy storage and fluorescence temperature sensing features in Bi<sub>0.5</sub>Na<sub>0.5</sub>TiO<sub>3</sub>-based transparent ceramics ...

In this paper, we address several experimental design issues: (a) the supportive role of fluorescence anisotropy measurements to the measuring concept, (b) the experimental setup used for non-contact measurements during capillary rheometer testing, and (c) molecular level environmental issues that arise during reactive processing and temperature profiling.

using SOLIDWORKS. The energy storage consists of the cabinet itself, the battery for energy storage, the BMSS to control the batteries, the panel, and the air conditioning to maintain the battery temperature in optimal condition. The cooling capacity from the AC is 0.45 kW. Each side of the cabinet has 16 batteries, 1 panel, and 1 AC system.

The paper presents a new technique based on laser-induced fluorescence, allowing droplet temperature measurement of evaporating and combusting droplets to be performed. The liquid spray is seeded with a low concentration of rhodamine B. The fluorescence, induced by the green line of an argon laser, is measured on two separated color bands. It is demonstrated that two ...

Noncontact measurement of temperature change in chemical or biological samples has been widely needed in various applications 1,2,3,4,5,6,7,8. One popular method for this purpose uses an infrared ...

The energy of excited fluorescence was much weaker than the incident laser. An optical filter was placed in front of the camera lens, which effectively blocked the 532 nm laser. Before the measurement, the aperture of the camera was adjusted appropriately to ensure that the fluorescence image can be identified and converted into gray value ...

Temperature sensor based on fluorescence measurement of The remote fiber sensor is based on a lifetime

# Energy storage cabinet fluorescence temperature measurement

measurement of 90 cm long EDF, which is diode-pumped by a 980 nm laser and can be used to measure temperature in the range of 26°C to 60°C.

The novel combination of optical tweezers and fluorescence lifetime imaging microscopy (FLIM) has been used, in conjunction with specially developed temperature-sensitive fluorescent ...

Figure 3 Experimental setup for laser-fluorescence temperature measurement. The cavitation fluorescence solution consists of 4 mL of copper nitrate solution with rhodamine B dye added. The concentrations of copper nitrate and rhodamine B by weight used for temperature measurement are 0.48 g CN and 0.07 mg R-B to 1 g deionized water.

1. A Photophysical Description of Fluorescence 237 2. Temperature-Dependent Fluorescent Phenomena 239  
2.1 Quantum Yield 240 2.2 Peak Wavelength 241 2.3 Fluorescence Emission from Molecular Complexes 242  
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Variable temperature fluorescence and the fluorescent recyclability of the APP composite fiber films suggest that they are promising for use in high-temperature warning and anti-counterfeiting applications. ... Da Cunha JP, Eames P (2016) Thermal energy storage for low and medium temperature applications using phase change materials-a review ...

In contrast, fluorescent thermometry (a specific application of the more general laser-induced fluorescence (LIF) technique) represents one of the most accurate temperature measurement techniques at the macroscale. In this technique, a fluorescent dye whose fluorescence intensity is a strong function of temperature is dissolved in a fluid of interest or is coated on a surface of ...

Two imaging methods are employed to observe the temperature field surrounding cavitation bubbles: shadowgraph imaging, which provided high-frame-rate (10<sup>4</sup> fps) qualitative observation of temperature within the liquid, and planar-laser-induced fluorescence (PLIF) imaging, which gave quantitative temperature measurements at a lower frame-rate (10<sup>3</sup> fps). A ...

In the present work, for noninvasive measurement of the liquid temperature in microchannels, the two-color ratiometric laser-induced fluorescence (LIF) technique was combined with the confocal microscopy. By using this technique, the fluorescent light from the tiny volume around a focusing spot can be selectively detected, and it enables us to measure the ...

This work describes a hydrogel fluorescence microsensor for prolonged stable temperature measurements. Temperature measurement using microsensors has the potential to provide information about cells, tissues, and ...

# Energy storage cabinet fluorescence temperature measurement

This paper presents a new temperature measurement technique in a liquid, based on laser-induced fluorescence of rhodamine B. The fluorescence intensity is detected on three spectral bands, where the ratios between the emission of each band determine the temperature while correcting for the effects of fluorescent re-absorption. In addition, the ...

Temperature measurement based on fluorescence intensity in hydroxyl tagging velocimetry (HTV) Jun Shao. 0000-0001-5517-6183 ; Jun Shao a) 1. School of Energy and Power Engineering, Xi'an Jiaotong University ... The energy density of a tagging signal in the measurement region of the flow field is 5 mJ/mm<sup>2</sup>, ...

a~11c are the temperature distribution inside the cabinet of cases 1, 2, and 3 (the temperature of the cabinet wall is 25 °C). In these cases, the cabinet are operated at a discharge rate of 1.0 ...

ARTICLE A new approach exploiting thermally activated delayed fluorescence molecules to optimize solar thermal energy storage Fan-Yi Meng 1,2, I-Han Chen<sup>1,2</sup>, Jiun-Yi Shen 1,2, Kai-Hsin Chang 1,2 ...

6 Temperature effects and photodecomposition in fluorescence spectrometry 6.1 Errors caused by temperature effects The fluorescence efficiency of many compounds is very sensitive to temperature variations and for accurate work, temperature regulation is necessary [1, 2]. Fluorescence yields and decay times usually

(a) The estimation of critical temperature (T<sub>C</sub>) for PS II photochemistry using continuous measurement of basal fluorescence (F<sub>0</sub>) on detached leaf segment during continuous heating with temperature increase rate app. 1°C per minute. The chlorophyll fluorescence measurement was realised by fluorometer PAM-2100 (Walz, Germany).

1 INTRODUCTION. The fast growth of the renewable electricity results in new challenges in electrical grids and power transformers. Although electricity generation from coal and gas fired power plants remains to be the major electric power source, renewable energy already encompassed 36.6% of China's total installed electric power capacity and 26.4% ...

Due to their excellent energy-storage performance (ESP) and high optical transmittance (T%), transparent pulse capacitors (TPCs) have significant application value in the field of vehicle electronics and information transmission [1], [2], [3]. However, their development and utilization are not only limited by their dependence on high applied electric fields (E) but ...



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