FluoSens

Fluorescence Detection in Scientific Applications

A Review of Published Evidence

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22	2012–2026	10+
journal articles	publication lineage	assay / sensing modes

Abstract

FluoSens is a compact, highly sensitive fluorescence detector designed for contact-free, real-time measurements in research, life sciences, device development, and industrial applications. Its flexible configuration allows it to be adapted to different wavelengths, fluorescent dyes, and measurement setups. This white paper reviews and highlights research published over the past ten years in which FluoSens has been used across a range of scientific applications.

The technology was originally developed in Stockach and commercialized first by QIAGEN and later by DIALUNOX. In July 2025, Dermagnostix acquired FluoSens technology, including the associated production assets, expertise, and intellectual property rights. Today, FluoSens is further developed and marketed under the brand **Lumalytix - powered by Dermagnostix**.

Introduction to FluoSens

FluoSens Go (formerly ESELog) is a flexible, plug-and-play fluorescence and reflectance measurement system designed for laboratory experiments, feasibility studies, and test setups. It can be connected directly to a computer and operated using the included FL Digital software. Accessories such as PCR tube and cuvette holders make it suitable for rapidly evaluating different samples and applications.

FluoSens Integrated is the compact OEM version developed for integration into analytical instruments, automated laboratory systems, and inline measurement applications. Its 10-pin ribbon cable, M3 mounting threads, and compact housing simplify mechanical and electrical integration. Lumalytix also supports customers in adapting and integrating the detector into their devices.

Both detector versions support the simultaneous measurement of two wavelength combinations and can be configured across a spectral range from **320 to 980 nm**. Standard configurations are available for common fluorophores such as FAM, HEX, ROX, Cy5, europium, and for UV fluorescence. Customer-specific wavelength configurations and adjustments of the measurement range are also possible.

While **FluoSens Go provides a ready-to-use platform for initial testing and application development, FluoSens Integrated enables the subsequent transfer into compact OEM devices and series-production systems.**

The table below shows technical specifications and exemplary detection limits. The fluorophores listed below are representative examples only.

Specification	FluoSens Go	FluoSens Integrated 1.0	FluoSens Integrated 2.0
Housing dimensions	82 × 52 × 17.8 mm	71.5 × 47 × 17.8 mm	71.5 × 47 × 17.8 mm
LLOD* – **FAM**	210 pM	210 pM	80 pM
LLOD* – **HEX**	40 pM	40 pM	40 pM
LLOD* – **ROX**	370 pM	370 pM	50 pM
LLOD* – **Cy5**	420 pM	420 pM	80 pM
Dynamic range	200 pM–0.8 µM	200 pM–0.8 µM	100 pM–0.8 µM
Sampling rate	100 sample/s		
Connection interface	Mini-USB / M12	10-pin ribbon cable	
Communication	TTL / RS232 / RS485		
Mounting interface	6 mm cage support rods	M3 threads	M3 threads

* LLOD: Lower limit of detection

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Validated Publication Corpus and Publication Matrix

The literature review identified 23 direct-use records for the FluoSens / Go detector family: 22 journal articles and one peer-reviewed conference contribution [1]–[23].

Published applications extend well beyond conventional PCR fluorescence detection and include qPCR, RT-PCR, adaptive PCR, LAMP, NASBA, RPA, high-resolution melting, methylation analysis, protein assays, coagulation analytics and general fluorescence sensing. The technology has been integrated into LabCards, droplet arrays, tubing systems, 3D-printed microreactors, magnetofluidic platforms and fiber-coupled or mechanically scanned systems.

Citation figures are database-dependent. OpenAlex (OA) counts for references [1]–[13] reflect the snapshot collected on 6 September 2026.

Abbreviations: RPA - Recombinase Polymerase Amplification; NASBA - Nucleic Acid Sequence-Based Amplification; HRM - High-Resolution Melting; LAMP - Loop-Mediated Isothermal Amplification

Core corpus [1]-[13]

Ref.	Publication	Journal	Year	DOI	OA	Application	Assay / technique
1	Tsaloglou et al. Real-time isothermal RNA amplification of toxic marine microalgae using preserved reagents on an integrated microfluidic platform.	Analyst	2013	10.1039/C2AN36464F	22	On-chip NASBA with internal control for real-time quantification of toxic marine microalgae.	NASBA / microfluidics
2	Athamanolap, Shin & Wang. Droplet Array Platform for High-Resolution Melt Analysis of DNA Methylation Density.	Journal of Laboratory Automation / SLAS Technology	2014	10.1177/2211068213507923	9	Automated scanning of a 4×4 droplet array for HRM and DNA methylation density.	HRM / droplet microfluidics
3	Creecy et al. Tuberculosis Biomarker Extraction and Isothermal Amplification in an Integrated Diagnostic Device.	PLOS ONE	2015	10.1371/journal.pone.0130260	20	Integrated magnetic-bead extraction and LAMP for tuberculosis with real-time fluorescence.	LAMP / magnetic extraction
4	Russ et al. A Prototype Biomarker Detector Combining Biomarker Extraction and Fixed Temperature PCR.	Journal of Laboratory Automation / SLAS Technology	2016	10.1177/2211068216634072	9	Automated extraction plus PCR in movable tubing with fluorescence through the transparent wall.	PCR / magnetic extraction
5	Sandetskaya et al. An integrated versatile lab-on-a-chip platform for the isolation and nucleic acid-based detection of pathogens.	Future Science OA	2017	10.4155/fsoa-2016-0088	14	Pathogen isolation, nucleic-acid processing and real-time amplification readout in one microfluidic platform.	LAMP / PCR / lab-on-chip
6	Adams et al. Adaptive PCR Based on Hybridization Sensing of Mirror-Image L-DNA.	Analytical Chemistry	2017	10.1021/acs.analchem.6b03291	19	Multi-channel L-DNA fluorescence actively controls PCR cycling rather than only reading an endpoint.	Adaptive PCR / qPCR
7	Chan et al. Moving toward rapid and low-cost point-of-care molecular diagnostics with a repurposed 3D printer and RPA.	Analytical Biochemistry	2018	10.1016/j.ab.2018.01.008	40	Repurposed 3D-printer mechanics scan reaction vessels past a fixed Go detector for low-cost RPA.	RPA / point-of-care
8	Euliano et al. Multiplexed Adaptive RT-PCR Based on L-DNA Hybridization Monitoring for the Detection of Zika, Dengue, and Chikungunya RNA.	Scientific Reports	2019	10.1038/s41598-019-47862-6	18	Four fluorescence channels enable adaptive RT-PCR and parallel detection of three arboviruses.	Multiplex adaptive RT-PCR

Ref.	Publication	Journal	Year	DOI	OA	Application	Assay / technique
9	Behrmann et al. 3D Printed Monolithic Microreactors for Real-Time Detection of Klebsiella pneumoniae and the Resistance Gene blaNDM-1 by Recombinase Polymerase Amplification.	Micromachines	2020	10.3390/mi11060595	7	Real-time RPA in a 3D-printed microreactor for K. pneumoniae and blaNDM-1.	rtRPA / 3D microreactor
10	Zimmers et al. Development of an Automated, Non-Enzymatic Nucleic Acid Amplification Test.	Micromachines	2021	10.3390/mi12101204	4	Automated enzyme-free nucleic-acid amplification with integrated fluorescence readout.	PiLOT / non-enzymatic amplification
11	Hasnain et al. Cancer Methylation Biomarker Detection in an Automated, Portable, Multichannel Magnetofluidic Platform.	ACS Nano	2024	10.1021/acsnano.3c10070	10	Portable methylation-specific qPCR for esophageal-cancer biomarkers in an automated magnetofluidic platform.	Methylation qPCR / magnetofluidics
12	Spurlock et al. Achievement of 15-Minute Adaptive PCR Benchmark with 1370 nm Laser Heating.	Biosensors	2025	10.3390/bios15040258	2	L-DNA feedback plus 1370-nm laser heating achieves a ~15-minute adaptive-PCR benchmark.	Adaptive / photothermal PCR
13	Alrefaey et al. A lab-on-a-chip system integrating DNA purification and loop-mediated isothermal amplification for the quantification of the toxic diatom Pseudo-nitzschia multistriata.	Sensors & Diagnostics	2026*	10.1039/D5SD00135H	0	FluoSens beneath the chamber monitors LAMP after on-chip DNA purification for toxic-diatom quantification.	LAMP / DNA purification / microfluidics

* [13] appeared online in 2025; the cited volume/issue assignment is in the 2026 journal year.

Additional relevant publications [14]-[23]

Ref.	Publication	Journal	Year	DOI	OA	Application	Assay / technique
14	Laouenan et al. A Self-contained Diagnostic Platform for DNA Concentration, Elution, and qPCR Inside a LabCard with Stored Reagents.	Procedia Engineering / Eurosensors XXVI	2012	10.1016/j.proeng.2012.09.434	n.v.	LabCard integrates DNA concentration, elution, stored reagents and real-time qPCR with FluoSens readout.	qPCR / LabCard / magnetic beads
15	Castro-López et al. A simple and portable device for the quantification of TNF-α in human plasma by means of on-chip magnetic bead-based proximity ligation assay.	Biosensors and Bioelectronics	2014	10.1016/j.bios.2013.10.039	n.v.	Portable TNF-α quantification from human plasma using a magnetic-bead PLA and fluorescence detection.	Proximity ligation / microfluidics
16	Gärtig et al. Development of a point-of-care-device for fast detection of periodontal pathogens.	BMC Oral Health	2015	10.1186/s12903-015-0155-y	n.v.	PCR-on-chip with real-time SYBR Green readout for a point-of-care periodontal-pathogen device.	PCR-on-chip / SYBR Green
17	Shao et al. Chip-based analysis of exosomal mRNA mediating drug resistance in glioblastoma.	Nature Communications	2015	10.1038/ncomms7999	n.v.	On-chip RT-qPCR quantifies exosomal mRNA associated with drug resistance in glioblastoma.	RT-qPCR / exosomes / microfluidics

Ref.	Publication	Journal	Year	DOI	OA	Application	Assay / technique
18	Schurgers et al. Thrombin Generation in Zebrafish Blood.	PLOS ONE	2016	10.1371/journal.pone.0149135	n.v.	Fluorogenic thrombin-generation measurement from zebrafish whole blood.	Thrombin generation / fluorimetry
19	Chen et al. Accomplishment of one-step specific PCR and evaluated SELEX process by a dual-microfluidic amplified system.	Biomicrofluidics	2021	10.1063/5.0045965	n.v.	Dual microfluidics combines real-time PCR and amplification PCR for cycle optimization and SELEX evaluation.	Real-time PCR / SELEX
20	Stark, Shin & Wang. A sample-to-answer droplet magnetofluidic assay platform for quantitative methylation-specific PCR.	Biomedical Microdevices	2018	PMC6341997	n.v.	Sample-to-answer droplet magnetofluidics performs quantitative methylation-specific PCR with compact Go readout.	qMSP / magnetofluidics
21	Esteso et al. Enhanced Fluorescence in a Lens-Less Fiber-Optic Sensor ...	Chemosensors 11(8), 448	2023	10.3390/chemosensors11080448	n.v.	Go serves as compact epi-fluorescence readout in a lens-less fiber-optic sensor architecture.	Fiber-optic fluorescence sensing
22	Rekeb et al. Performance evaluation of a semivolatile aerosol dichotomous sampler: impact of design issues.	Aerosol Research	2024	10.5194/ar-2-183-2024	n.v.	Go quantifies extracted fluorescein for mass balance and deposition characterization of an aerosol sampler.	Fluorescein aerosol quantification
23	Kelchtermans et al. Simultaneous measurement of thrombin generation and fibrin formation in whole blood under flow conditions.	Thrombosis and Haemostasis	2016	PMID: 27074907	n.v.	Go tracks thrombin generation alongside fibrin formation in whole blood under flow.	Thrombin/fibrin / rheometry

Application Fields

Infectious disease and point-of-care diagnostics

Creecy et al. combined biomarker extraction and LAMP for tuberculosis [3]. Sandetskaya et al. integrated pathogen isolation, nucleic-acid processing and amplification-based detection in a lab-on-a-chip platform [5]. Gärtig et al. used an Go USB E470/D520 for PCR-on-chip detection of periodontal pathogens [16]. Chan et al. showed that a stationary Go reader can be combined with the motion system of a repurposed 3D printer to create a low-cost RPA platform [7]. Behrmann et al. extended the concept toward antimicrobial resistance, using real-time RPA in a 3D-printed monolithic microreactor for Klebsiella pneumoniae and blaNDM-1 [9].

Adaptive and ultra-fast PCR

References [6], [8] and [12] form a distinct technical lineage. Adams et al. used two dual-channel Go fluorimeters so fluorescence from L-DNA hybridization could feed back into PCR control [6]. Euliano et al. expanded the concept to four optical channels and multiplex RT-PCR for Zika, Dengue and Chikungunya RNA [8]. Spurlock et al. combined the feedback approach with 1370-nm laser heating and reported an approximately 15-minute benchmark [12]. In these studies, the optical detector is part of the assay-control loop rather than only a downstream reader.

Oncology, epigenetics and liquid biopsy

Athamanolap et al. used Go to scan a 4×4 droplet array for high-resolution melt analysis of DNA methylation density [2]. Stark et al. integrated Go into a sample-to-answer droplet magnetofluidic platform for quantitative methylation-specific PCR [20]. Hasnain et al. advanced the platform concept to an automated portable multichannel system for cancer methylation biomarkers [11]. A particularly important additional record is Shao et al. [17], where a miniaturized Go is used in a microfluidic platform for exosomal mRNA analysis in

glioblastoma. The publisher/index cited-by value of 726 makes this the most visible publication in the expanded corpus, but that figure refers to citations of the paper as a whole—not to citations of FluoSens/Go itself.

Environmental and marine monitoring

Tsaloglou et al. used “FluoSens integrated” from QIAGEN Lake Constance in a microfluidic NASBA platform for real-time detection of toxic marine microalgae [1]. More than a decade later, FluoSens Integrated was placed directly under a LAMP reaction chamber for quantification of the toxic diatom Pseudo-nitzschia multistriata [13]. Together these papers demonstrate continuity of the detector lineage in portable environmental analytics.

Protein, coagulation and general fluorescence analytics

The expanded corpus shows that the detector family is not limited to nucleic-acid assays. Castro-López et al. quantified TNF-α in human plasma via a magnetic-bead proximity ligation assay [15]. Schurgers et al. used Go for fluorogenic thrombin-generation measurements in zebrafish whole blood [18], while Kelchtermans et al. coupled fluorescence readout to a flow/rheometry setup for simultaneous thrombin and fibrin analysis [23]. More recent work uses Go in fiber-optic fluorescence sensing [21] and for fluorescein quantification during aerosol-sampler characterization [22].

Technical Integration Patterns

Integration pattern	Published evidence
Direct chamber readout	Detector positioned directly above or below a microfluidic reaction chamber, e.g. [1], [13].
Through-wall / tubing readout	Fluorescence measured through transparent tubing or reaction vessels, e.g. [4].
Mechanical scanning	Sample or detector motion used to scan multiple reaction positions with one optical module, e.g. [2], [7].
Fiber coupling	Optical fibers separate the reaction zone from the detector, e.g. [11].
Spectral multiplexing	Multiple channels used for true multiplex fluorescence measurements, e.g. [8].
Closed-loop process control	Fluorescence signals used in real time to control thermocycling, e.g. [6], [12].

Assay Compatibility Demonstrated in the Literature

Assay / technique	References	What the publications demonstrate
qPCR / PCR	[4], [6], [11], [14], [16], [17], [20]	Real-time measurement in tubing, LabCards, microfluidic chips and magnetofluidic platforms; in some cases with process feedback.
RT-PCR	[8], [17]	RNA targets, multiplex arboviruses and exosomal mRNA.
LAMP	[3], [5], [13]	Isothermal real-time fluorescence after integrated or upstream sample preparation.
NASBA	[1]	Isothermal RNA amplification with internal control in a microfluidic platform.
RPA / rtRPA	[7], [9]	Low-temperature amplification for low-cost POC and antimicrobial-resistance applications.
Adaptive PCR	[6], [8], [12]	Optical signals used in a closed control loop for PCR thermocycling.
HRM	[2]	Temperature-resolved fluorescence curves for DNA methylation density.
Non-enzymatic amplification	[10]	Automated PiLOT readout beyond classical polymerase/isothermal systems.
Proximity ligation	[15]	Protein biomarker TNF-α with fluorescence readout.
Thrombin / fibrin	[18], [23]	Fluorogenic coagulation analytics in whole blood and under flow conditions.
General optical sensing	[21], [22]	Fiber-optic fluorescence and fluorescein aerosol quantification outside classical NAATs.

Product Name and Manufacturer History

To capture the full body of published evidence, the literature search covered the historical product and manufacturer names associated with the fluorescence-detection technology. Earlier publications refer to QIAGEN or QIAGEN Lake Constance GmbH as the manufacturer and identify the products as Go, Go USB or FluoSens Integrated. Later publications partly reference DIALUNOX.

Following Dermagnostix's takeover of the fluorescence-detection technology, Lumalytix was established as the brand under which these products are continued. FluoSens Go represents the continuation of the former Go product line, while FluoSens Integrated remains part of the current Lumalytix portfolio. Consequently, "Go" is an important historical search term within the Lumalytix technology lineage rather than a separate, unrelated product family.

Research lineage: QIAGEN / QIAGEN Lake Constance → Go / FluoSens Integrated → DIALUNOX → Lumalytix / FluoSens Go / FluoSens Integrated.

This lineage reflects the evolution of manufacturers, brands and product names. It does not imply that all hardware generations are technically identical or share the same specifications. The manufacturer and product names stated in the original publications are retained in the references to ensure accurate bibliographic reporting.

Metholdology, Citation Metrics and Limitations

The search combined "FluoSens", "FluoSens Integrated", "FluoSens Go", "Go", "ESELog", "QIAGEN Lake Constance", "DIALUNOX" and "Lumalytix" with assay, microfluidics and publication terms. Direct-use inclusion was preferred when the Methods section, full text or an associated primary source named the detector as part of the experiment.

Reviews, patents, dissertations, product brochures and pure secondary citations were not counted as independent experimental applications. A review that mentions Go is useful context, but not an additional direct-use record.

Two further hits were intentionally not included in the 23-record core because venue/peer-review/DOI metadata could not be normalized to the same standard. Consequently, 23 is not a theoretical upper bound; it is the currently structured corpus.

Citation counts are database-dependent. For [1]–[13], the OpenAlex counts shown here are the snapshot already collected on 6 September 2026. For newly added records [14]–[23], OpenAlex was not fully refreshed in the deep-research run and are therefore marked "n.v." rather than estimated.

A high citation count for a paper does not mean that the detector itself has been cited that many times. It means that the publication as a whole has received that number of citations in the stated source.

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Summary

This white paper reviews more than a decade of peer-reviewed research demonstrating the use of FluoSens fluorescence detector technology across a broad range of scientific applications. Published studies have integrated FluoSens into platforms using PCR/qPCR, RT-PCR, LAMP, NASBA, RPA, and non-enzymatic amplification, as well as diverse OEM and microfluidic architectures.

The documented applications extend from molecular diagnostics and fluorescence-based process control to environmental monitoring and biosensing. Collectively, the evidence demonstrates the versatility of FluoSens as a compact optical detection technology that can be adapted to different assay formats, system architectures, fluorophores, and measurement requirements.