



GloMax®-Multi Detection System: Luminescence, Fluorescence and Absorbance in One Instrument

ABSTRACT | The GloMax®-Multi Detection System is the next-generation instrument in the GloMax® line. It shares the state-of-the-art luminescence performance found in the other GloMax® instruments, but adds the capability of reading fluorescence intensity and absorbance. The easy-to-use operation and high performance of the GloMax®-Multi Detection System brings enhanced versatility to the lab and makes generating high-quality, biologically relevant data easier.

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The GloMax®-Multi Detection System has fully independent luminescence, fluorescence and absorbance detection modules allowing different light paths and detectors optimized for the best performance of each module.



Figure 1. The GloMax®-Multi Detection System.

INTRODUCTION

As the study of biology becomes more complex, increasingly sophisticated tools are required to advance discovery. While assay selection plays a major role in the type of data generated in any given experiment, the role of instrumentation is often overlooked. The capability of an assay to fully reflect the outcome of an experiment is critical for capturing high-quality data. Likewise, the instrument used to measure the results of the assay signal is critical.

Bioluminescence-based assay technology is recognized for great sensitivity and broad dynamic range. Because luciferase depends on a chemical substrate to generate light, different luciferases can be used together in an assay, and the assay chemistry can be used to measure each luciferase independently. Such combined assays include the Dual-Luciferase® Assays and the Chroma-Glo™ Luciferase Assay. It is also possible to multiplex a fluorescent assay reagent with a subsequent luminescent assay to collect two independent data points from the same sample (1).

This provides more consistency in the data generated and a deeper understanding of the biological process being studied.

The GloMax® line of instruments is designed to provide optimal measurement of signals from bioluminescence assays. The GloMax®-Multi Detection System (Figure 1) is the next-generation luminometer in the GloMax® line, featuring superior luminescence capabilities as well as the availability to use absorbance and fluorescence detection modules with assays in a 96-well format. This combination of capabilities in a single, easy-to-operate instrument creates an ideal platform for capturing high-quality data, especially when multiplexing.

INDEPENDENT DETECTION MODULES FOR OPTIMAL RESULTS

The GloMax®-Multi Detection System has fully independent luminescence, fluorescence and absorbance detection modules (Figure 2), providing light paths and detectors optimized for the best performance of each module.



Figure 2. Inside the GloMax®-Multi Detection Instrument.

A typical luminometer consists of a light-sensitive photomultiplier tube (PMT) within a light-proof exterior. The PMT is situated close to the light-emitting sample for maximum sensitivity and collects signal over the entire spectrum of light. Multifunction readers that can read absorbance, fluorescence and luminescence are flexible instruments, but these instruments are not usually optimally designed for reading luminescence. Often sensitivity and dynamic range are compromised because the instruments use long path lengths for filter wheels, fiber optical cables and other assemblies. As a result, extremely bright or dim samples cannot be read appropriately by these instruments, and the data are compromised. The design of the GloMax®-Multi Detection System allows uncompromised performance in luminescence detection that equals that of high-quality, standalone luminometers.

The GloMax®-Multi Absorbance Module (Cat.# E7061) is driven by an LED-based light source running into a six-position filter wheel. The filter wheel has four preinstalled filters suitable for typical laboratory applications such as ELISAs and protein assays. Two open positions allow accessory filters to be added for other applications. A 490 nm filter suitable for measuring the signal from the CellTiter 96® AQ_{ueous} Cell Viability Assay is available separately.

The GloMax®-Multi Fluorescence Module (Cat.# E7051) uses a series of Optical Kits with optimized light sources and excitation and emission filter pairs. The assortment of Optical Kits enables the GloMax®-Multi Detection System to be used with a wide variety of common fluorophores such as fluorescein, rhodamine, Cy®3, Cy®5 and Hoechst. The careful selection of an LED-based excitation light and high-quality filter sets allows the fluorescence system to match or exceed lamp-based systems excited by broad spectrum light sources.

The Optical Kits are designed with specific applications in mind so that the ideal assay performance can be obtained by simply plugging in the proper Optical Kit and measuring the sample.

EASY OPERATION

The GloMax®-Multi Detection System can be operated entirely through a touch screen interface. Protocols for a variety of Promega assays as well as common laboratory assays are preinstalled. The system also offers the flexibility to modify the protocols or create new methods. Data can be saved on the instrument and moved using the included USB flash drive, allowing the station to work as a standalone workstation in the laboratory. This also frees computing resources from data capture, so more resources can be directed toward analysis.

COMBINING INSTRUMENT AND ASSAY DESIGN

The utility of the GloMax®-Multi Detection System coordinated design is demonstrated with the MultiTox-Glo Assay (Cat.# G9270). This assay uses a live-cell protease substrate conjugated to the fluorophore AFC. After incubation with this live-cell substrate, the fluorescence is measured using the AFC Optical Kit on the GloMax®-Multi Detection System. Once the live-cell measurement is complete, the relative number of dead cells can be measured in the same sample using the luminogenic dead-cell protease substrate. By multiplexing these two signals, precise measurements of both cell viability and cytotoxicity can be obtained in a single-well sample with sequential additions (Figure 3). The optimized performance of the GloMax® System allows uncompromised data collection from both signals.

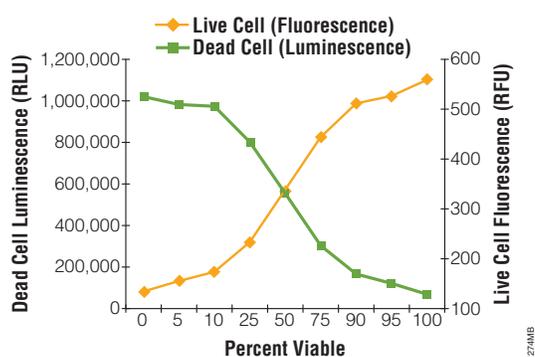


Figure 3. MultiTox-Glo Assay results on the GloMax®-Multi Detection System. Jurkat cells were adjusted to 100,000 cells/ml in RPMI 1640 + 10% FBS. The pool was split: one was mildly sonicated to simulate 100% cytotoxicity; the other was left untreated. The treated and untreated pools were blended in various ratios to represent viabilities from 0–100% and plated in replicate 100 µl volumes (10,000 cell equivalents per well). RPMI 1640 + 10% FBS served as background control. GF-AFC Reagent (50 µl) was added to each well, incubated for 30 minutes at 37 °C, and fluorescence measured using the AFC Optical Kit on the GloMax®-Multi Detection System. AAF-Glo™ Reagent was added in 50 µl volumes to each well, incubated at room temperature for 15 minutes, and luminescence was measured on the GloMax®-Multi Detection System. Cell-free background fluorescence and luminescence were subtracted from the data sets prior to graphing.

CONCLUSION

The GloMax®-Multi Detection System provides a high-performance system that can be combined with assays, including Promega assays, to bring enhanced versatility to the lab, making it easier to generate high-quality, biologically relevant data. The versatility of the GloMax®-Multi Detection System allows you to easily multiplex assays, which means you can get more data from each sample.

REFERENCE

1. Niles, A. (2006) *Cell Notes* 16, 12–5.

ORDERING INFORMATION

Product	Size	Cat.#
GloMax®-Multi Base Instrument	1 each	E7031
Single Injector System for GloMax®-Multi Detection System	1 each	E7071
Dual Injector System for GloMax®-Multi Detection System	1 each	E7081
GloMax®-Multi Luminescence Module	1 each	E7041
GloMax®-Multi Fluorescence Module	1 each	E7051
GloMax®-Multi Absorbance Module	1 each	E7061
GloMax® Luminometer Light Plate	1 each	E6531
GloMax®-Multi Detection System External PC Connect	1 each	E8961

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