

LUMINICELL TRACKER™ – CELL LABELLING KITS

INTRODUCTION

Luminicell Tracker™ are biocompatible organic nanoparticles with great biocompatibility, photostability, and high signal intensity. The products are designed to be used for long-term tracking of live cells. Once Luminicell Tracker™ enter the cells, they remain strong and stable fluorescence that allows long-term *in vitro* tracking of stained cells for up to 10 generations and monitoring the distribution and fate of *in vivo* transplanted cells for 42 days. These properties make them optimal candidates for long interval live cell bioimaging experiments.

Luminicell Tracker™ contains unique organic molecules in the nanoparticle core that possess aggregation-induced emission (AIE) properties. Unlike conventional fluorophores, these AIE molecules emit strong fluorescence in aggregate form at the nanoparticle core. Normal fluorophores suffer from an effect commonly known as aggregation-caused quenching (ACQ), in which molecules lose fluorescence upon aggregation.

KEY BENEFITS

| | |
|------------------------|---|
| High Brightness | 10X brighter fluorescence than quantum dots of similar sizes |
| Photostable | Stable intensity after 30 minutes of continuous laser irradiation |
| Biocompatible | Low toxicity, cell viability >95% after 48 hours of incubation |
| Cell Tracking | 10 cell generations <i>in vitro</i> , 42 days <i>in vivo</i> |

Table 1. Luminicell Tracker™ selections and their compatible instrument parameters.

| Product Name | Laser excitation λ (nm) | Filter Set (nm) |
|--|---------------------------------|-----------------|
| Luminicell Tracker™ 540 – Cell Labelling Kit (Green) | 405*/458/488 | 480 – 560 |
| Luminicell Tracker™ 670 – Cell Labelling Kit (Red) | 458/488*/543 | 670 – 800 |
| Luminicell Tracker™ 810 – Cell Labelling Kit (NIR-I) | 543/633*/755 | 700 – 1000 |
| Luminicell Tracker™ 1010 – Cell Labelling Kit (NIR-II) | 405/755*/808 | 900 – 1100 |

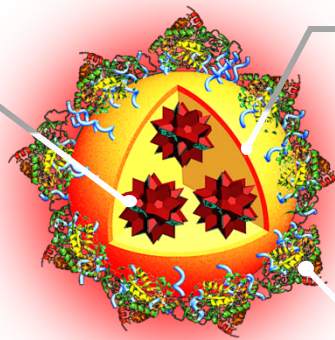
*Denotes the best excitation wavelength for fluorescent signal.

TECHNOLOGY

Luminicell Tracker™ is designed and built with patented technology platform that integrates three technology edges:

1. Unique AIE Fluorescence Dyes

Novel materials that have high brightness and unique spectral properties



2. Biocompatible encapsulation matrix

Biocompatible lipid polymer matrix that enables materials to be delivered and stable for both *in vitro* and *in vivo*

3. Tunable surface targeting groups

Proprietary surface moieties that enable high cellular uptake efficiency

Scheme 1. Luminicell Tracker™ proprietary technology platform.

Combining the above technology edges resulted in the ultra-brightness, long-lived fluorescent with low cytotoxicity for Luminicell Tracker™. This allows researchers to perform long-term live cell tracking, monitoring of cell movement, cell fate, and deep tissue imaging, suitable for *in vivo* biodistribution studies.

APPLICATIONS

Compatible and efficient cell labelling with different cell lines

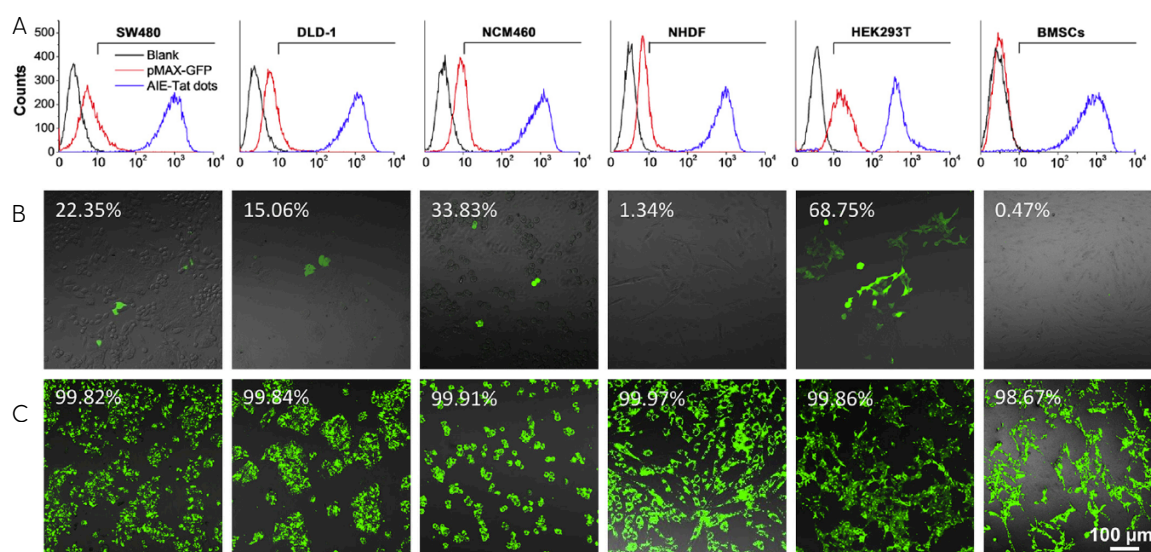
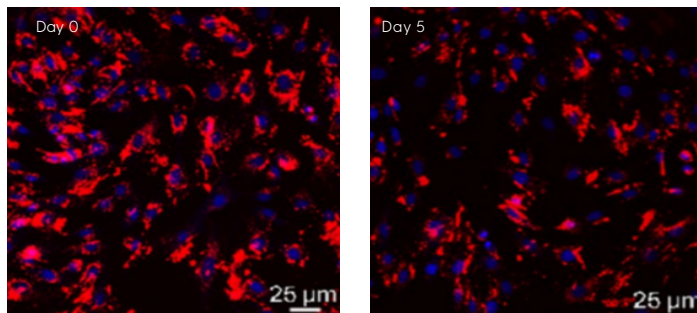
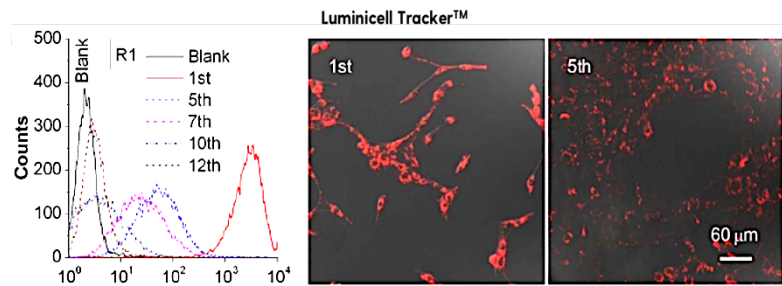


Fig 1. Comparative flow cytometry histograms and confocal images of different cell lines transfected with green fluorescent protein (GFP) or labelled with 2 nM of Luminicell Tracker™ 540 overnight at 37 °C. (From left to right: SW480, DLD-1, NCM460, NHDF, HEK293T, BMSCs)

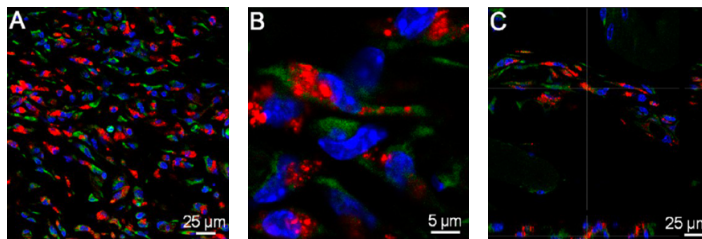
Cell proliferation and lineage tracing of cancer cells

Fig 2. Flow cytometry histogram and confocal images of MCF-7 cells labelled with 2 nM of Luminicell Tracker™ 670 for 4 hours at 37 °C and subcultured for designated passages.



Long-term *in vitro* tracking of adipose-derived stem cells (ADSCs)

Fig 3. Confocal images of ADSCs labelled with 1 nM of Luminicell Tracker™ 670 (red) for 4 hours at 37 °C and then subcultured for 1 and 5 days, respectively.

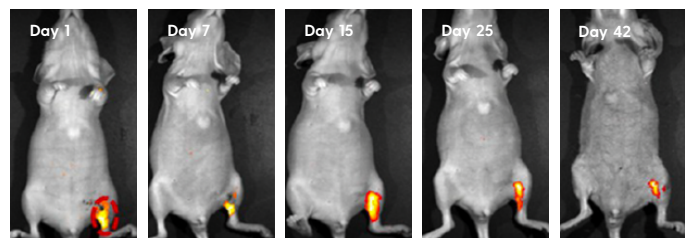


Tracking of ADSCs *in vivo* at single-cell resolution

Fig 4. Confocal images of mice ischemic hind limb slices showing ADSCs labelled with Luminicell Tracker™ 670 (red), post intramuscular injection for (A, B) 30 days and (C) 42 days.

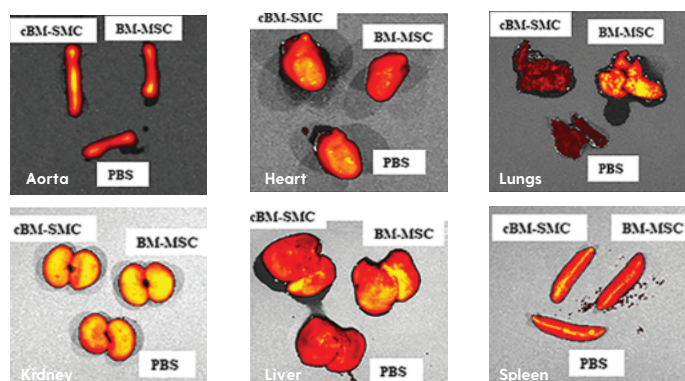
In vivo localization of ADSCs in mice

Fig 5. Mice injected with ADSCs that have been pre-labelled with 1 nM of Luminicell Tracker™ 670 were imaged with *in vivo* fluorescence imaging system for up to 42 days.



In vivo biodistribution of mesenchymal stem cells (MSCs) in mice

Fig 6. Ex vivo images of organs taken using IVIS Spectrum CT showing the distribution of cells in different organs at 2 weeks. Cells were labelled with Luminicell Tracker™ 670.



REFERENCES

1. *Biomaterials* **2014**, 24, 8669.
2. *Scientific Reports* **2013**, 3, 1150.
3. *ACS Nano* **2014**, 8, 12620.
4. *Stem Cells Translational Medicine* **2022**, 11, 850.

LUMINICELL TRACKER™ – VASCULAR LABELLING KITS

INTRODUCTION

Luminicell Tracker™ are biocompatible organic fluorescent nanoparticles, that can be used to fluorescently tag vasculature in living tissues and animals to visualise vascular structures and study inflammation and vascular leakage. Under normal conditions, these nanoparticles flow smoothly inside blood vessels. However, under inflammation or infection, they leak out in response to blood vessel permeability changes and form localized punctate aggregates, accumulating in surrounding tissues.

Luminicell Tracker™ contains unique organic molecules in the nanoparticle core that possess Aggregation Induced Emission (AIE) properties. Unlike conventional fluorophores, these AIE molecules emit strong fluorescence in aggregate formation at the nanoparticle core. Normal fluorophores suffers from an effect commonly known as aggregation caused quenching (ACQ), which molecules loss fluorescence upon aggregation.

Luminicell Tracker™ is built to be highly compatible with both one-photon and multi-photon fluorescence imaging, enabling deep tissue imaging applications with minimal biological interference. These excellent properties make them optimal candidates to be used as diagnostic reagents.

KEY BENEFITS

High Brightness 10X brighter fluorescence than quantum dots of similar sizes

Photostable Stable intensity after 30 minutes of continuous laser irradiation

Table1 Compatible instrument parameters for Luminicell Tracker™.

| Product Name | Laser excitation λ (nm) | Filter Set (nm) |
|--|-------------------------|-----------------|
| Luminicell Tracker™ 540 – Vascular Labelling Kit (Green) | 405* /458/488 | 480 – 560 |
| Luminicell Tracker™ 670 – Vascular Labelling Kit (Red) | 458/ 488* /543 | 670 – 800 |
| Luminicell Tracker™ 810 – Vascular Labelling Kit (NIR-I) | 543/ 633* /755 | 700 – 1000 |
| Luminicell Tracker™ 1010 – Vascular Labelling Kit (NIR-II) | 405/ 755* /808 | 900 – 1100 |

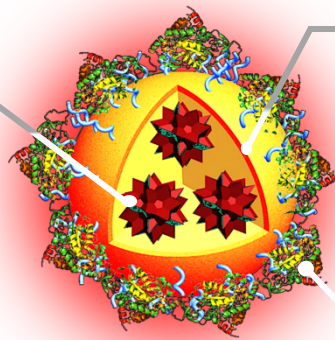
*Denotes the best excitation wavelength for fluorescent signal.

TECHNOLOGY

Luminicell Tracker™ is designed and built with patented technology platform that integrates three technology edges:

1. Unique AIE Fluorescence Dyes

Novel materials that have high brightness and unique spectral properties



2. Biocompatible encapsulation matrix

Biocompatible lipid polymer matrix that enables materials to be delivered and stable for both *in vitro* and *in vivo*

3. Tunable surface targeting groups

Proprietary surface moieties that can allow targeting biomarkers of interest

Fig 1 Luminicell Tracker™ proprietary technology platform.

Combining above technology edges resulted in the ultra-brightness, long-lived fluorescent with low cytotoxicity for Luminicell Tracker™. This allows researchers to perform long-term vascular imaging. Luminicell Tracker™ – Vascular Labelling Kit is designed with inert surface groups, which does not bind specifically to any biomarkers, allowing them to flow smoothly inside blood vessels. Under inflammation or infection, they leak out in response to blood vessel permeability changes form localized punctate aggregates, accumulating at surrounding tissues.

APPLICATIONS

Early identification of haemorrhage sites of mice

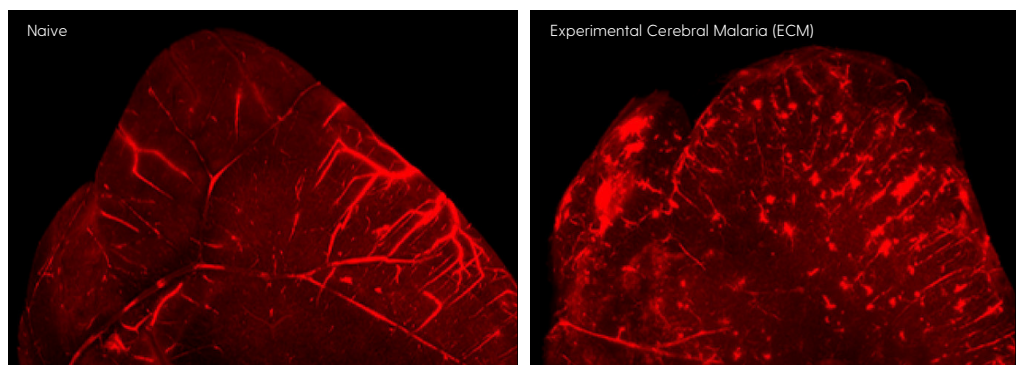


Fig 1. Light sheet microscopic whole-brain images of naïve mouse (left) or experimental cerebral malaria (ECM) infected mice. Brain vasculatures for the naïve mouse brain and haemorrhage sites for the ECM mouse brain can be highlighted clearly with Luminicell Tracker™ 670 respectively.

Real-time two-photon blood vasculature imaging in live mice

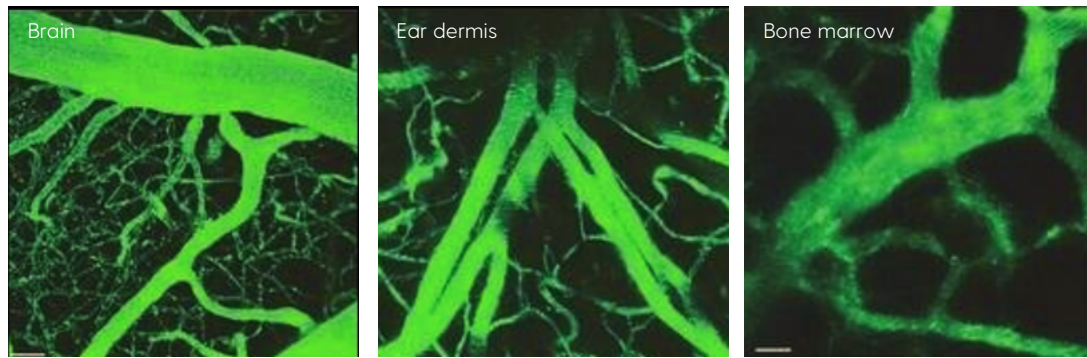
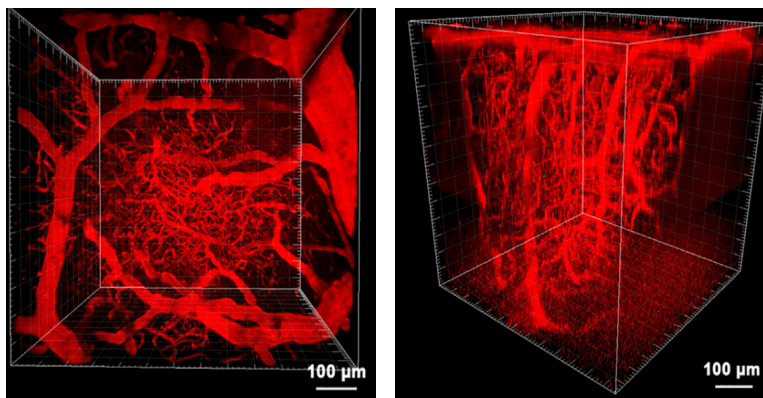
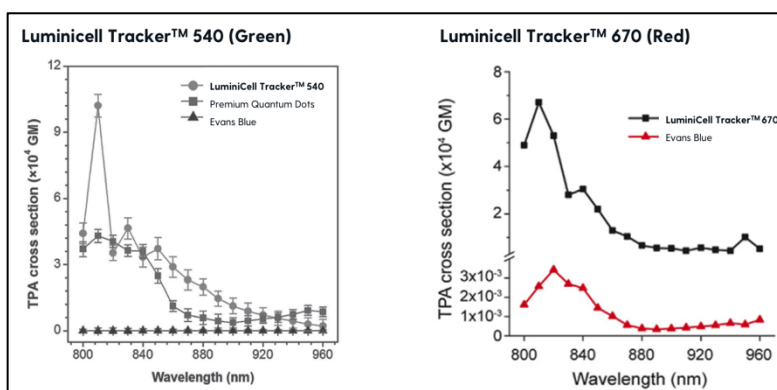


Fig 2. Models of the mouse brain, ear dermis, and bone marrow, imaged with an intravital two-photon fluorescence microscope, vascular labelled with Luminicell Tracker™ 540.



3D Vascular Reconstruction

Fig 3. 3D reconstruction of vascular systems with clear imaging, labelled with Luminicell Tracker™ 670.



Two-photon absorption spectra of Luminicell Tracker™

Fig 4. Two-photon absorption spectra for Luminicell Tracker™ 540 and 670.

REFERENCES

1. *Biomaterials* **2018**, 152, 77.
2. *Advanced Materials* **2013**, 25, 6083.

PRODUCT CATALOGUE

Luminicell Tracker™ are highly emissive fluorescent organic nanoparticles with great biocompatibility, built for long-term tracking of live cells and blood vessels.

| Product Category | Product Name | Descriptions | Absorption Maximum | Emission Maximum | Pack Size | Part No. |
|--------------------------|--|--|--------------------|------------------|---|-----------------|
| Cellular Trackers | Luminicell Tracker™ 540 - Cell Labelling Kit (Green) | Long-term non-invasive cell tracking fluorescent probes (Green) | 423 | 540 | Standard vial, 500 µL (Up to 100 tests) | LCTC-540-30-ST |
| | | | | | Half vial, 250 µL (Up to 50 tests) | LCTC-540-30-HS |
| | | | | | Trial vial, 100 µL (Up to 10 tests) | LCTC-540-30-TS |
| | Luminicell Tracker™ 670 - Cell Labelling Kit (Red) | Long-term non-invasive cell tracking fluorescent probes (Red) | 506 | 670 | Standard vial, 500 µL (Up to 100 tests) | LCTC-670-30-ST |
| | | | | | Half vial, 250 µL (Up to 50 tests) | LCTC-670-30-HS |
| | | | | | Trial vial, 100 µL (Up to 10 tests) | LCTC-670-30-TS |
| | Luminicell Tracker™ 810 - Cell Labelling Kit (NIR-I) | Long-term non-invasive cell tracking fluorescent probes (NIR-I) | 635 | 810 | Standard vial, 500 µL (Up to 100 tests) | LCTC-810-30-ST |
| | | | | | Half vial, 250 µL (Up to 50 tests) | LCTC-810-30-HS |
| | | | | | Trial vial, 100 µL (Up to 10 tests) | LCTC-810-30-TS |
| | Luminicell Tracker™ 1010 - Cell Labelling Kit (NIR-II) | Long-term non-invasive cell tracking fluorescent probes (NIR-II) | 725 | 1010 | Standard vial, 500 µL (Up to 100 tests) | LCTC-1010-30-ST |
| | | | | | Half vial, 250 µL (Up to 50 tests) | LCTC-1010-30-HS |
| | | | | | Trial vial, 100 µL (Up to 10 tests) | LCTC-1010-30-TS |
| Vascular Trackers | Luminicell Tracker™ 540 - Vascular Labelling Kit (Green) | Long-term vascular tracking fluorescent probes (Green) | 423 | 540 | Standard vial, 500 µL | LCTV-540-30-ST |
| | | | | | Half vial, 250 µL | LCTV-540-30-HS |
| | | | | | Trial vial, 100 µL | LCTV-540-30-TS |
| | Luminicell Tracker™ 670 - Vascular Labelling Kit (Red) | Long-term vascular tracking fluorescent probes (Red) | 506 | 670 | Standard vial, 500 µL | LCTV-670-30-ST |
| | | | | | Half vial, 250 µL | LCTV-670-30-HS |
| | | | | | Trial vial, 100 µL | LCTV-670-30-TS |
| | Luminicell Tracker™ 810 - Vascular Labelling Kit (NIR-I) | Long-term vascular tracking fluorescent probes (NIR-I) | 635 | 810 | Standard vial, 500 µL | LCTV-810-30-ST |
| | | | | | Half vial, 250 µL | LCTV-810-30-HS |
| | | | | | Trial vial, 100 µL | LCTV-810-30-TS |
| | Luminicell Tracker™ 1010 - Vascular Labelling Kit (NIR-II) | Long-term vascular tracking fluorescent probes (NIR-II) | 725 | 1010 | Standard vial, 500 µL | LCTV-1010-30-ST |
| | | | | | Half vial, 250 µL | LCTV-1010-30-HS |
| | | | | | Trial vial, 100 µL | LCTV-1010-30-TS |

For Research Use Only. Not intended for any animal or human therapeutic or diagnostic use.

Upon receiving products, store them at 2 – 8 °C, do not freeze. Shelf-life is 18 months from manufacturing.