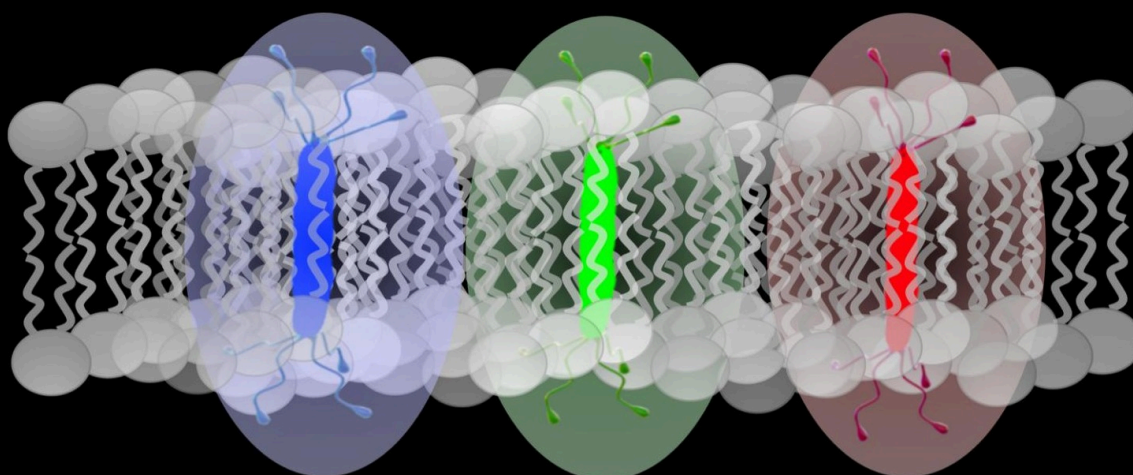


TECH OFFER

Water-Soluble Conjugated Oligoelectrolytes as Advanced Fluorogenic Dyes

COE Dyes “Light-Up” only in the Lipid Bi-Layer and are uniquely structured to span the entire bilayer



KEY INFORMATION

TECHNOLOGY CATEGORY:

Chemicals - Organic

Healthcare - Diagnostics

TECHNOLOGY READINESS LEVEL (TRL): **TRL8**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO175095**

OVERVIEW

The technology comprises fluorogenic dyes based on Water Soluble Conjugated Oligoelectrolytes (COEs), a class of organic molecules designed for improved detection of extracellular vesicles (EVs) and lipid nanoparticles. EVs are naturally occurring lipid nanoparticles released by cells and crucial in cell-to-cell communication. Once thought as a way for cells to clear trash, EVs are of increasing interest in medical research. However, traditional methods for EV detection can be plagued by background noise and difficulty in specifically targeting EVs. COEs offer a solution by functioning as biocompatible and water-soluble probes that specifically bind to EVs. This enables sensitive and accurate detection of EVs using techniques like flow cytometry. The dyes are not just cosmetic improvements—they are fundamentally new intelligent materials. Their novel design permits them to span the full depth of the lipid bilayer, a feat that no other dye has achieved. In comparison to classic dyes used in life science, this dye does not give false positives. They are intelligent molecules that only light up when the dye finds an exosome. This novel technology has immense utility in bioimaging applications, thanks to their tunable optical properties and affinity for lipid bilayers in the academic as well as industry settings where exosome detection is involved.

TECHNOLOGY FEATURES & SPECIFICATIONS

Conjugated oligoelectrolytes (COEs) are amphiphilic, fluorogenic molecules that spontaneously intercalate within lipid bilayer membranes. Being a full lipid bilayer spanning dyes, COEs are gaining attention as optical probes, particularly for EV detection by flow cytometry. Their unique structure consists of a hydrophobic core and two hydrophilic tails. This grants COE dyes excellent water solubility and prevents them from clumping together. Additionally, COEs mimic the structure of cell membranes, allowing them to interact with and label EVs selectively. This targeted approach minimizes interference from other particles and enhances the accuracy of EV detection.

Ideal collaboration partners for this technology include research institutions and medical diagnostic manufacturers focused on developing advanced tools for EV analysis and IVD kits.

POTENTIAL APPLICATIONS

The fluorogenic dye is highly relevant in the detection of exosomes. This technology holds promise for various applications in the life sciences sector. COEs can be instrumental in:

- **Extracellular Vesicle Research:** Studying the role of EVs in various diseases and developing EV-based diagnostic tools.
- **Drug Discovery:** Utilizing EVs as drug delivery vehicles and monitoring their effectiveness.
- **Biomarker Development:** Identifying specific EVs associated with particular diseases for earlier diagnosis.
- **QC Validation:** Ensuring and validating Quality Control in cosmetics as well as therapeutics based on exosome technology.

MARKET TRENDS & OPPORTUNITIES

The global exosomes market size was valued at USD 112.25 million in 2022 and is anticipated to expand at a compound annual growth rate (CAGR) of 32.75% by 2030. Exosomes are also known as Extracellular Vesicles (EVs) and are encased within a single outer membrane. They are secreted by all cell types and have been found in saliva, urine, plasma, semen, breast milk, Cerebral Spinal Fluid (CSF), amniotic fluid, bronchial fluid, bile, lymph, serum, gastric acid, synovial fluid, and tears. These vesicles carry proteins and genetic information throughout the body and create paths for communication between cells. The key factors driving the industry include technological advancements in exosome isolation and analytical procedures, advanced applications of exosomes, growth in government and non-government initiatives for exosome research, and the increasing prevalence of cancer.

UNIQUE VALUE PROPOSITION

COEs offer significant advantages over existing methods for EV detection:

- **Enhanced Specificity:** COEs specifically target EVs, minimizing background noise and improving detection accuracy.
- **No False Positives:** COEs have a unique structure that does not cause micelle formation and hence reduces the chances of false positives considerably.
- **Water Solubility:** Their water solubility allows for easier use and eliminates the need for organic solvents, which can be harmful.
- **Biocompatibility:** COEs are designed to be biocompatible, minimizing potential harm to cells or biological samples.
- **Versatility:** Not just for EVs also for bacteria typing and animal models.