OPTICALLY ENCODED DNA BARCODE PARTICLES

Tech ID: 33866 / UC Case 2025-075-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Over the past decade, single-cell sequencing has become widely used in biology and medicine. To analyze many cells at once, each cell must be labeled with a unique DNA barcode so its molecules can be identified after sequencing. This is usually done by capturing cells on barcode beads, where each bead carries a different DNA sequence. However, because these barcodes are randomly generated and randomly paired with cells, researchers cannot know which barcode belongs to which cell before sequencing, making it difficult to link sequencing data with other measurements from the same cell. This creates a clear gap in the market for barcoding approaches that provide predefined, traceable cell identities prior to sequencing.

This invention, Optically Recognizable Barcoded Beads (ORBBs), comprises a method in which each barcode bead is optically unique such that the DNA sequence for a given bead can be determined by imaging the bead with a fluorescent microscope. The key idea behind ORBBs is that each bead has geometrically distinct regions that can be fluorescently labeled within a single bead. This drastically increases the number of unique fluorescent barcodes that can be produced by these beads. ORBBs are able to be barcoded through the same standard split pool process that other commercially available barcoded beads use with one key modification - each well the barcode beads pass through has a unique combination of oligo conjugated fluorophores, creating a unique barcode on each bead.

SUGGESTED USES

- **Imaging-based cellular experiments:** ORBBs are able to be used technological platforms that enable imaging based cellular measurements to be linked to sequencing based measurements, allowing researchers to investigate how genotype and gene expression influence cellular phenotype.
- **Spatial Transcriptomics:** The use of ORBBs would allow researchers to do single-cell (or small-number of cell) sequencing on tissues while preserving the location of the cell with respect to the rest of the tissue.

ADVANTAGES

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

» **Nanotechnology**

» NanoBio

» **Sensors & Instrumentation**

» Biosensors

RELATED CASES

2025-075-0

- **Throughput and Usability:** A commercialized ORBBs product could be paired with microwell sequencing assays, giving any biology lab the ability to run imaging and sequencing based multi-omic assays.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Methods for Measuring Protein-DNA Interactions with Long-read DNA Sequencing

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