Microspheres

Small spherical particles, with diameters in the micrometer range (typically 1 µm to 1000 µm (1 mm)). Microspheres are sometimes referred to as microparticles.

Microspheres can be manufactured from various natural and synthetic materials. Glass microspheres, polymer microspheres and ceramic microspheres are commercially available. Solid and hollow microspheres vary widely in density and, therefore, are used for different applications. Hollow microspheres are typically used as additives to lower the density of a material. Solid microspheres have numerous applications depending on what material they are constructed of and what size they are.

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see Embosphere

Encoded beads, also known as microsphere or microbead-based encoding systems, are microscopic particles made of various materials, such as polymers, glass, or magnetic materials, that are used to carry and encode information. Each encoded bead has a unique identifier or “code” that distinguishes it from other beads. These encoded beads find applications in various fields, including biotechnology, chemistry, and diagnostics. Here are some key points about encoded beads:

Unique Identification: Encoded beads are characterized by their ability to carry a unique identifier, typically in the form of a barcode, color combination, fluorescence pattern, or magnetic property. This identification code allows researchers to distinguish between different beads in a pool or mixture.

Materials: Encoded beads can be made from various materials, depending on the application. Common materials include polystyrene, silica, magnetic particles, and polymer-coated metal nanoparticles.

Applications:

Biotechnology: Encoded beads are widely used in high-throughput screening, combinatorial chemistry, and assays. They can be functionalized with molecules like antibodies, nucleic acids, or small molecules for binding to specific targets.

Multiplexed Assays: Encoded beads are valuable in multiplexed assays where multiple analytes are detected simultaneously within a single sample. Each type of bead can carry a different capture molecule, allowing the detection of various targets in parallel.

Drug Discovery: Encoded beads enable the rapid screening of compounds for drug discovery by assessing their interactions with biological targets.

Genomics and Proteomics: In DNA sequencing and protein analysis, encoded beads are used to carry and identify specific sequences or proteins, facilitating high-throughput analysis.

Single-Cell Analysis: Encoded beads can be used for single-cell analysis to profile individual cells' characteristics, gene expression, or protein levels.

Bioinformatics: Encoded beads generate large datasets, and bioinformatics tools are often used to analyze and interpret the data.

Reading and Detection: Specialized equipment, such as flow cytometers, microscopes, or magnetic separators, is used to read and detect the encoded beads. These instruments can identify the unique codes associated with each bead and analyze their properties.

High Throughput: Encoded beads enable high-throughput experiments by allowing the simultaneous analysis of many samples or molecules. This is particularly valuable in research and diagnostics.

Customization: Researchers can customize encoded beads by selecting the appropriate size, material, and encoding method to suit their specific applications.

Encoded Bead Libraries: Libraries of encoded beads with diverse codes and functionalities are commercially available, providing researchers with a wide range of options for their experiments.

Advancements: Ongoing research focuses on improving the encoding methods, increasing the number of unique codes, and enhancing the compatibility of encoded beads with various analytical techniques.

Encoded beads have revolutionized the way researchers perform experiments and assays, enabling more efficient and versatile high-throughput analysis across various scientific disciplines.