QBET

Quantum biological tunnelling for electron transfer.

Quantum-dot-encoded beads for multiplexed biomarker analysis (QBET) is a technology used in the field of diagnostics and medical research for the simultaneous detection and quantification of multiple biomarkers or analytes in a single sample. It combines the properties of quantum dots (QDs) and encoded beads to enable highly sensitive and multiplexed assays.

Here's a breakdown of how QBET works:

Quantum Dots (QDs): Quantum dots are nanoscale semiconductor particles that emit fluorescent signals when excited by light. They have unique optical properties, such as high brightness and tunable emission spectra, making them ideal for multiplexed assays.

Encoded Beads: Encoded beads are microspheres with unique optical or chemical properties that serve as carriers for biomolecular assays. Each type of bead is distinguishable based on its unique code, typically encoded by a combination of fluorescent dyes or other markers.

Multiplexed Assays: In QBET, different types of encoded beads are conjugated with specific capture molecules (such as antibodies or nucleic acids) that selectively bind to the target biomarkers of interest. These capture molecules are chosen to recognize different biomarkers.

Sample Analysis: When a sample (e.g., blood or tissue) containing the biomarkers is introduced to the QBET system, the capture molecules on the encoded beads selectively bind to their respective targets.

Detection: Excitation light is applied to the sample, causing the QDs on the beads to emit fluorescent signals. The emitted fluorescence is detected and analyzed to determine the presence and quantity of different biomarkers based on the specific codes of the beads and their fluorescence signals.

QBET offers several advantages in biomarker analysis:

Multiplexing: It allows the simultaneous detection of multiple biomarkers within a single sample, providing a more comprehensive view of the biological processes under investigation.

Sensitivity: Quantum dots are highly sensitive and emit bright signals, making it easier to detect low concentrations of biomarkers.

Quantification: QBET allows for the quantification of biomarkers, enabling researchers to measure the exact levels present in a sample.

High Throughput: It is suitable for high-throughput applications, making it valuable in clinical diagnostics and research settings.

Reduced Sample Volume: QBET can analyze multiple biomarkers in a small sample volume, conserving precious clinical or research samples.

Overall, QBET is a powerful technology that has applications in fields such as cancer research,

infectious disease diagnostics, and personalized medicine, where the simultaneous measurement of multiple biomarkers is essential for accurate diagnosis and treatment.