CY-699 Nanosensors

Classification of sensors: Optical sensors, Chemical sensors, Electrochemical sensors, Mass sensitive sensors, Biosensors, mechanism of chemical and biological recognition: biomimetic systems, (bio) chemical selectivity, immobilization techniques.

Nanosensor Synthesis– Bottom up approach

(a) Nanosphere Synthesis: microemulsion, Ostwald ripening, Electrical: Zeta potential Measurement, steric hindrance, aggregation kinetics, Particle stability, role of thermodynamics and kinetics in determining shape and size.

(b) Nanoparticle Separation: Rate Zonal Centrifugation, Chromatography & electrophoresis.

Nanoparticle Surface Modification

Stabilization against aggregation, Phase transfer: Ligand exchange, Ligand modification, Polymer coatings, Silanization, Particle functionalization: Chemical functional groups Biomolecules, Fluorescent dyes, Multi-functional nanoparticles

Optical nanosensors: Optical absorption properties of nanomaterials, colorimetric sensing strategies, Noble Metal Nanoparticles, Colorimetric Gold Nanoparticle Spectrophotometric Sensor, Fluorescent pH-Sensitive Nanosensors, Quantum Dots as fluorescent labels, Techniques of optical detection: absorptiometry, UV-visible apsorption spectroscopy, reflectometry, luminescence spectroscopy, light scattering techniques, direct and indirect methods, indicator based systems.

Analytical figures of merit

selectivity, sensitivity, precision, accuracy, response time, repeatability, reversibility,

Applications of nanosensors: Applications in detection of ions, small organic molecules, cancer cells, proteins.