the control. Thus, these novel nonviral carriers are very efficient, versatile, and biocompatible polymers for nonviral gene delivery.

2104-Pos

Measurement of Linear Compressibility in Transpalpebral Tonometry

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We have measured the force required to depress the palpebrum over the center of the cornea in human patients and found that the curve is linear to within the accuracy of our measurements (R-value 0.9991). The motivation of this measurement is its clinical relevance to the development of a device to measure the intra ocular pressure in patients at risk for glaucoma without touching the cornea. This class of device has promise for patient-operated tonometry, including glaucoma monitoring in third-world counties. We find that non-linearity in the compressibility develops proportional to the distance of the center of the point of application of force from the center of the cornea. We show that this non-linearity can give rise to uncertainty in determination of the compressibility, with values up to 30% as compared to the well-aligned case with values typically 4%. We show that the compressibility value varies from subject to subject because of its three sources: the palpebrum, the cornea supported by the intra ocular pressure and the retropulsive structures. We find that the linearity of the compressibility of the compound structure and therefore of each of its constituents is intrinsic. We conclude that the understanding of the linearity of the compressibility indicates feasibility of this class of tonometer for glaucoma monitoring.

2105-Pos

Concentration and Removal of Waterborne Bacteria for Easy Detection

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In the past decade a significant amount of research and development has been geared towards water treatment and distribution, especially in low income areas. Large fractions of this research have focused on waterborne contaminant removal, such as filters and flocculation agents, and biosensors designed to detect waterborne threats. In low income areas many of the currently used treatment methods are not suitable as they commonly are more expensive and difficult to maintain. Problems have also been observed with biosensors including a very low sensitivity, making it difficult to get accurate readings when low bacteria concentrations are present. In an attempt to address both of these problems in conjunction with one another, we have been studying the effects of a natural compound extracted from the Opuntia ficus-indica cactus as a flocculation and concentration agent for bacteria suspended in water. This material, known as mucilage, has proven to be an effective tool for aggregating and removing the sediment kaolin, and has also demonstrated flocculation of E. coli, B. cereus and B. subtilis. In bacteria treated columns thus far, the response in mucilage treated columns was almost immediate and large flocs were observed to form both with the naked eye and using a light microscope. Removal rates of up to 97% were also observed. Current tests with B. anthracis (fully attenuated) also demonstrate a great potential for mucilage in the fields of water treatment and biosensors. The aggregated bacteria that are formed within the column settle to the bottom forming a compact pellet that can then be removed for testing with biosensors. This type of flocculating agent has the potential to be very valuable in both of these fields because it is inexpensive, sustainable and easy to process and use.

2106-Pos

Size Distributions of Quantum Dots and Colloidal Gold Nanoparticles Using Analytical Ultracentrifugation

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Colloidal gold and quantum dot nanoparticles are currently an area of significant interest in the biomedical field with important applications in the diagnosis and treatment of human disease. The hydrodynamic diameter of nanoparticles is a critical parameter in the development of potential diagnostic and therapeutic agents. Electron microscopy and light scattering methods have been used predominantly in the past to determine particle sizes, but analytical ultracentrifugation sedimentation velocity is a technique that has been gaining more attention as it provides significantly higher resolution particle size distributions. Here, we apply the sedimentation velocity technique to commercially-available stocks of colloidal gold and quantum dot nanoparticles. The size-distributions obtained from this method are compared to those obtained from dynamic light scattering measurements conducted in parallel. Further, comparison of changes in particle sedimentation rate affected by increasing solution density was employed as an alternative method to densimetry in order to determine the particle partial specific volume- a parameter requisite for determining molecular weights. This work demonstrates the utility of the sedimentation velocity technique for the characterization of nanoparticles.

2107-Pos

Magnetic and Fluorescence Detection of Hybridized DNA Assemblies Immobilized onto a Hall Device

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The development of a dual detection platform to probe and discriminate nucleic acid base-pairing events through a combination of fluorescent and magnetic signatures may significantly impact the performance and dimensions of biomedical sensing devices. Toward this aim, investigations on the selective and controlled assembly of DNA duplex formation onto a micro-scale Hall device will be addressed. The biological assembly is composed of three distinct components. The first component is a streptavidin-coated magnetic nanobead (350 nm mean diameter) pre-conjugated with both biotinylated and fluorescently labeled ssDNA. The second component is thiolated ssDNA that was selectively immobilized onto photolithography prepared Au patterns on a fabricated Hall sensor. The third component is the label free target ssDNA sequence for detection, which is complementary to both the biotinylated and thiolated DNA sequences. The device readout consists of a decrease in voltage across the Hall junction due to the biologically assembled magnetic nanobead, as well as a redundant fluorescence signature. The Hall device sensitivity is approaching single nanobead bead detection. Support: NIH NIGMS GM079592.

2108-Pos

Refractometry Measurements for Industrial Quality Control

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A knowledge of the optical properties of liquid substances is useful in enhancing the understanding of their unique characteristics. Properties such as refractive index, refractivity, and phase velocity have been used to assess the purity of liquids. We utilized measurements from a Digital Refractometer to detect and quantify the contamination of liquids such as drinking water, wine, and other beverages. We used antifreeze, ethylene glycol, and propylene glycol as contaminants. Results show that the level of contamination increases linearly with refractive index and that a contamination level of 1 % is detectable. The application of this technique in industrial settings will improve the detection of contamination of beverages.

2109-Pos

Dielectric Relaxation Spectroscopy and Dark-Field Imaging Based Quantification of Amyloid-Beta Fibrillization Via Transparent Nanogap Electrodes

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Since the precise role of amyloid-β aggregates in causing the neurodegenerative diseases is still unknown, understanding of amyloid-β fibrillization is a focus of interest for the development of innovative therapeutic and diagnostic applications. The fibrillization of amyloid-β has similar growth characteristics of polymeric nanoparticles and current monitoring methods show only qualitative or static information. Here we describe a non-invasive real-time monitoring of nanoscale amyloid-β fibrillization by simultaneous Dielectric Relaxation Spectroscopy and label-free dark-field imaging. First, the hydrodynamic radius is characterized by DRS, which can reflect the averaged radius of fibrilized amyloid-β, and we observe an increase from 19 to 21 nm during 48 hours. Second, scattering intensity from DF imaging allowed us to visualize and quantify the fibrillization with respect to the incubation time of amyloid-β. The total intensities were consistently increased and this change showed a good agreement with the change of hydrodynamic radii. Consequently, real-time observation and quantification of changes in