Title
Fluorescence correlation spectroscopy in turbid media: Ultrasensitive detection of bacteria, viruses, and protein aggregates

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Abstract

We are further developing a simple, inexpensive, and powerful alternative technique to detect and analyze, without enrichment, extremely low concentrations of cells, bacteria, viruses, and protein aggregates in turbid fluids for clinical and biotechnological applications. The anticipated applications of this technique are many. They range from the determination of the somatic cell count in milk for the dairy industry, to the enumeration and characterization of microorganisms in environmental microbiology and the food industry, and to the fast and ultrasensitive detection of protein aggregates for the diagnosis of Alzheimer's and other neurodegenerative diseases in clinical medicine. A prototype instrument has been built and allowed the detection and quantification of particles down to a few per milliliter in short scanning times. It consists of a small microscope that has a horizontal geometry and a mechanical instrument that holds a cylindrical cuvette (1 cm in diameter) with two motors that provide a rotational and a slower vertical inversion motions. The total volume that is explored is large (~ 1ml/min for bright particles). The data is analyzed with a correlation filter program based on particle passage pattern recognition. We are working on improving the sensitivity of the technique, expanding it for multiple-species discrimination and enumeration, and testing the prototype device in actual clinical and biotechnological applications. The main clinical application of this project seeks to establish conditions and use this new technique to quantify and size-analyze oligomeric complexes of the Alzheimer's disease b-peptide in cerebrospinal fluid and other body fluids as a molecular biomarker ... [truncated at 250 words]