The Realisation of Research

Ultra-Fast Fluidic Analysis

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Category(s):
Nanotechnology
Diagnostic/Prognostic

Description:

Ultra-Fast Fluidic Analysis

Available For: Licensing and collaborative development

Summary

A research group at UCL have developed a new microfluidic-based method which can be used in combination with either chemical or optical heating-based denaturation to measure protein stability curves and calculate affinity constants from nanolitre sample volumes.

Measurement times are significantly reduced from standard methods and envisaged applications range from high-throughput drug discovery to healthcare diagnostics and pathogen detection.

The Technology and its Advantages

Chemical denaturation: In this version of the method, a microfluidic set-up is used to measure label-free chemical denaturation of proteins. Results are achieved in ultra-low volumes (20 nanolitres), and measurements are acquired in seconds. The intrinsic protein fluorescence is measured for a series of chemical denaturant concentrations, and a high signal-to-noise ratio achieved. Protein stabilities, binding constants and affinities are easily calculated from the curves.

Thermal denaturation: High-speed thermal denaturation is achieved *in situ* on a confocal microscope, with fine temperature control. Fluorescence changes due to denaturation are measured using the scanning confocal beam. In principle this technique for thermal denaturation can also be applied to the above chemical denaturation set-up, removing the need for confocal optics.

Market Opportunity

In addition to high-throughput drug screening, the technique has applications in rapid protein quantitation, pre-formulation and formulation optimisations of proteins, and real-time monitoring of protein quality/stability in chromatographic eluate streams.

The technique also allows rapid changes in temperature, potentially useful for example in polymerase-chain-reaction (PCR) DNA amplification, flow chemistry systems or experiments requiring rapid localised temperature fluctuations of cellular environments. Coupled with fluorescence detection it enables rapid real-time PCR on microfluidic sample volumes for diagnostic purposes, e.g. detection of HIV and measurement of viral loading.

Intellectual Property Status

Patent application has entered the National phase

Further Information

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