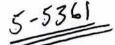
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(54) Tiue: METE OD OF MEASURING CHEMICAL CONCENTRATION BASED ON SPATIAL SEPARATION AND RESOLUTION OF LUMINESCENCE

## (57) Abstract

A method and associated apparatus for measuring chemical concentration in a liquid cample based on spatial separation and resolution of light is disclosed. The method is preferally applied to sensitive, quantitative, luminescence-based biosensors which reads the analyte concentration via spatial distribution of the emitted light. The detection of light is used to assess the spatial position, rather than the intensity or wavelength, of emitted light. A bioluminescent or chemiluminescent reaction requiring, for example, ATP, NADPH or NADH as a specific, and sensitive co-factor is used. ATP or NADH concentration is modulated, "mined" and/or regulated via, for example, an enzyme which consumes (consumess) ATP, NADPH, or NADH, thereby producing a spatial distribution of ATP or NADH and a spatial distribution in the emitted light. By appropriate control of the consumase or "synthase" activity and kinetics, a sensitive, by appropriate control of the constraint pattern is produced, permitting detection. The specific, and easy readable luminescent pattern is produced, permitting detection. The method is applicable to a wide range of analyses, biochemicals and substrates by use of additional substrat - specific enzymes dependent on ATP concentration for their activity. The figure graphically depicts a single channel ATP sensor, where a specific ATP sample (22) is contacted with the ATP consumase immobilized in or on a hydrophilic gel matrix (24) causing a lower concentration of ATP to enter the transduction region (26) and react with, for example luciferase and luciferin, photons emitted and detected by operator (28).

