perature may be controlled by placing a temperature sensor on the heating block surface and using the output of this temperature sensor to modify the current flow through the high wattage resistor/MOSFET. One additional advantage of this implementation is that the MPPC silicon photodiode gain (The MPPC silicon photodiode is the detector used to measure the intensity of light emitted by the target fluorophores in the test strip) is sensitive to ambient temperature, therefore implementing the optical block top surface as a heater would also ensure that the ambient temperature in proximity to the MPPC silicon photodiode is controlled.

[0109] An alternative method of heating the sample cartridge would be to create a very thin heating element. The fact that the heating element would be very thin (100-250 microns) would also mean that a magnet could be positioned underneath the element and still be in close proximity to the cartridge so that the magnetic beads can be gathered. The thin heating element could take the form similar to that of a flexible PCB, with copper tracks sandwiched between two polymer layers. One side of the layer could then be coated with a reflective material, or a have a reflective layer adhered onto it to make the mirrored surface if the heating element were required to reflect light emitted from the target fluorophores back towards the MPPC silicon photodiode. Alternatively, in the event that background fluorescence becomes an issue in the system, one side of the element could have a matt black finish as opposed to a reflective surface.

[0110] The Optical block of the reader of the present invention may be capable of providing the light sources for multiple fluorophore excitation wavelengths and measuring the subsequent emitted light from the fluorophores. It is the intensity of this light emitted from the fluorophores in the disposable test cartridge that will provide the assay measurement. The Optical Measurement Block is responsible for measuring the amount of target analyte present in the cartridge through the associated bound labels, such as fluorophores. The Optical measurement block may comprise a multi pixel photon counter (MPPC) silicon photodiode (for example Hamamatsu S10362-11-100C) and a high power wideband LED which emits a broad spectrum of wavelengths (for example HP803WW Roithner LaserTechnik GmbH).

[0111] A MPPC silicon photodiode may be preferred as it has a very high internal gain (in the region of 1 million) compared to a standard photodiode (gain=1) or an avalanche photodiode (gain=in the region of 100). One convenient feature of the MPPC silicone photodiode is that its internal gain varies in relation to the reverse bias voltage that is applied to it (for example a bias voltage of 70V results in a gain of approx 1 million while a bias voltage of 65V results in a gain of approx 100,000). This relationship can be used by the reader to manipulate the dynamic range of the measurement system, i.e. for higher analyte concentrations the photodiode bias voltage can be reduced to ensure the photodiode output does not saturate the instrument electronics. It should be noted that in alternative embodiments a standard photodiode or an avalanche photodiode could be implemented in place of a MPPC silicon photodiode.

[0112] A high power wideband LED is convenient so that a single LED can be used to generate multiple excitation wavelengths (i.e. the light that is incident on the target analyte fluorophores) through having a filter slide that can be moved to place different filters in front of the LED to generate different wavelengths. The filter slide also contains filters associated with the silicon photodiode in order to block out the excitation light so that the silicon photodiode measures only the light emitted by the fluorophores.

[0113] With reference to the 2 channel cartridge as shown in FIG. **1**, the Optical measurement block may be arranged such that there are 2 sets of LED and silicon photodiodes, one for each channel in the strip. The location of the photodiodes and LEDs are fixed. The filter slide can be moved such that different filters can be placed between the LEDs and the MPPC silicon photodiodes for different measurements. Alternatively, instead of having 2 fixed sets of LED and silicon photodiodes, there could be a single optical head implemented that can move between the different test channels.

[0114] Alternative embodiments of the stated configuration of the optical block are as follows:

[0115] 1. In one embodiment, both the excitation source and the emission detector are located on the same face of the cartridge. An alternative to this is that the cartridge is sandwiched between the emission source and the emission detector.

A reason that the source and detector may be located on the same surface is to allow space for the integration of the cartridge with the fluidic management system, cartridge connector interface, heating block and magnetic particle control.

[0116] 2. In another embodiment, there is the implementation of a movable filter slide to allow selectivity in the excitation and detection of a number of fluorophores. In a simpler configuration where only a single fluorophore per channel is required to be detected, the filter slide would not be required and could be replaced with a single, fixed excitation filter and a single emission filter for each channel.

[0117] 3. In a further embodiment, the light source for the excitation of the fluorophores comes from a broad band emitter. Alternative implementations where there is not the need to excite at multiple wavelengths could include wavelength specific light sources such as narrow band LED's.

Another alternative to a wideband LED would be a xenon flash lamp, the intensity of a xenon flash lamp is much greater than that of an LED. In addition a xenon flash lamp emits over a larger range of wavelengths. Where broad band 'white' or 'warm white' LEDS can emit down to a wavelength of around 400 nm, xenon flash lamps can emit down to around 200 nm meaning that xenon flash lamps can be used for excitation wavelengths in the UV range.

[0118] 4. In another embodiment, the optic block configuration could comprise of directing the excitation light at a dichroic mirror (or beamsplitter) mounted at an angle of 45 degrees to the normal which reflects the excitation light through 90 degrees towards the sample in the disposable test cartridge. The dichroic mirror is chosen such that the excitation light generated by the fluorophore is at a wavelength that travels through the dichroic mirror (i.e. is not reflected back towards the emission source) where the silicon photodiode is situated for detection of the emitted light. Additional optical filters may also be placed in front of the light source and optical detector in this configuration in order to narrow the pass band of light wavelengths produced by the emitter and accepted by the detector.

[0119] Due to the variation in processes associated with the manufacturing of disposable assay test cartridges it is nor-