WHAT IS CLAIMED IS:

1. Apparatus comprising:

a signal processor or processing module configured to:

receive signaling containing information about light reflected off fluorophores in a liquid and sensed by a linear sensor array having a length and rows and columns of optical elements; and

determine corresponding signaling containing information about a fluorophore concentration of the liquid that depends on a spatial gradient of the light reflected and sensed along the length of the linear sensor array, based upon the signaling received.

2. Apparatus according to claim 1, wherein the signal processor or processing module is configured to determine the fluorophore concentration based upon an attenuation of an optical signal sensed across the length of ~~apparatus comprises~~ the linear sensor array.

3. Apparatus according to claim 1, wherein the linear sensor array comprises a linear photodiode array, a linear CCD array or a linear CMOS array.

4. Apparatus according to claim 1, wherein the linear sensor array comprises a closed cylinder sensor array having a three-dimensional cylindrical array of the rows and columns of the optical elements.

5. Apparatus according to claim 1, wherein the spatial gradient is determined by a linear array algorithm that defines a relationship between the fluorophore concentration [c], the length or location (l) along the linear sensor array, a species absorption coefficient (α), and a signal (S(l)) of an array optical element along the linear spatial array.

6. Apparatus according to claim 5, wherein the linear array algorithm takes the form of the equation:

$$y = mx + b,$$

where $y = -\ln (S(l))$,

$mx = \alpha [c] l$, and

$b = -\ln ([c]AT_0)$.

7. Apparatus according to claim 6, wherein the linear array algorithm is based on Beer's law.

8. Apparatus according to claim 1, wherein the apparatus is a spatial gradient-based fluorometer.

9. Apparatus according to claim 1, wherein the apparatus comprises a quasi-collimated light source having a corresponding length and being configured to provide the light, including quasi-collimated light, along the length of the linear sensor array.

10. Apparatus according to claim 1, wherein the signal processor or processing module is configured to determine the fluorophore concentration based upon an attenuation of an optical signal sensed across the linear sensor array, including along the length and width of the linear sensor array.

11. Apparatus according to claim 1, wherein the linear sensor array comprises a two-dimensional array of the optical elements that are individually addressable.

12. Apparatus according to claim 1, wherein the optical elements are individually addressable by the signal processor or processing module.

13. Apparatus according to claim 12, wherein

either the rows or the columns of the optical elements are connected in parallel and addressable by the signal processor or processing module;

the apparatus includes a transmission photodiode located at an end of the linear sensor array, opposite the light source, configured to respond to the light reflected off the fluorophores and provide transmission photodiode signaling containing information about the same; and

the signal processor or processing module is configured to receive the photodiode signaling and correct the corresponding signaling for drift or the inner filter effect.

14. A method comprising:

receiving, with a signal processor or processing module, signaling containing information about light reflected off fluorophores in a liquid and sensed by a linear sensor array having a length and rows and columns of optical elements; and

determining, with the signal processor or processing module, corresponding signaling containing information about a fluorophore concentration of the liquid that depends on a spatial gradient of the light reflected and sensed along the length of the linear sensor array, based upon the signaling received.

15. A method according to claim 14, wherein the method comprises configuring the linear sensor array as a linear photodiode array, a linear CCD array or a linear CMOS array.

16. A method according to claim 14, wherein the method comprises determining the fluorophore concentration based upon an attenuation of an optical signal sensed across the length of the linear sensor array.

17. A method according to claim 14, wherein the method comprises configuring a light source to provide the light, including using a quasi-collimated light source to provide quasi-collimated light.

18. A spatial gradient-based fluorometer comprising:

a quasi-collimated light source having a length and being configured to provide quasi-collimated light to a liquid sample;

a linear sensor array having a corresponding length and rows and columns of optical elements and configured to sense light reflected off fluorophores in the liquid sample along the length of the collimated light source and provide signaling containing information about the light reflected off the fluorophores; and

a signal processor or processing module configured to:

receive the signaling; and

determine corresponding signaling containing information about a fluorophore concentration of the liquid that depends on a spatial gradient of the light reflected and sensed along the corresponding length of the linear sensor array, based upon the signaling received.

19. A spatial gradient-based fluorometer according to claim 18, wherein the linear sensor array comprises a linear photodiode array, a linear CCD array, or a linear CMOS array.

20. A spatial gradient-based fluorometer according to claim 18, wherein the spatial gradient is determined by a linear array algorithm that defines a relationship between the fluorophore concentration [c], the length or location (l) along the linear sensor array, a species absorption coefficient (α), and a signal (S(l)) of an array optical element along the linear spatial array.