

SUMMARY OF THE INVENTION

[0013] According to one aspect, a method for normalizing laboratory instruments with pure dyes includes providing at least one reference instrument and a test instrument, each instrument comprising at least one excitation filter and at least one emission filter arranged in pairs; providing a plurality of pure dyes, each dye comprising a fluorescent component and contained in a pure dye plate comprising a plurality of wells; generating fluorescent spectra from the reference instrument and the test instrument for multiple pure dyes across multiple filter combinations; creating a pure dye matrix, M_{ref} , for the reference instrument and a pure dye matrix, M , for the test instrument; calculating correction factors for each filter pair and multiplying the correction factors by the pure dye spectra; normalizing the corrected pure dye spectra; generating multicomponent data.

[0014] In another embodiment, the fluorescent spectra from the reference instrument and the test instrument are first normalized and then averaged over multiple wells to form the pure dye matrices.

[0015] In another embodiment, dye matrix M is multiplied by a set of adjustment factors that are iteratively modified to minimize the difference between matrix M and matrix M_{ref} .

[0016] In another embodiment, the adjustment factors are modified between 0 and 1.

[0017] In another embodiment, the correction factor is the product of the emission filter factor and the excitation filter factor.

[0018] In another embodiment, the corrected pure dye spectra are normalized to a value of one.

[0019] In another embodiment, the multicomponent data is derived from the product of the fluorescence data and the pseudo-inverse dye matrix M .

[0020] According to another aspect, a system for normalizing laboratory instruments with pure dyes includes a pure dye reference matrix, M_{ref} ; a plurality of instruments, each comprising: a plurality of filter pairs; and at least one pure dye plate; a computer system in communication with the plurality of instruments comprising: at least one processor; and at least one computer-readable medium comprising instructions for pure dye normalization executable by the processor to perform processing comprising: calculating correction factors for each filter pair; multiplying the correction factors by pure dye spectra; and normalizing the corrected pure dye spectra.

[0021] In another embodiment, the filter pairs comprise an excitation filter and an emission filter.

[0022] In another embodiment, the pure dye plate comprises at least one fluorescent pure dye contained in a sample plate comprising a plurality of sample wells.

[0023] In another embodiment, the processor executes instructions designed to generate a test spectra matrix M .

[0024] In another embodiment, matrix M_{ref} and matrix M comprise normalized and averaged spectra.

[0025] In another embodiment, the processor further executes instructions designed to iteratively adjust matrix M until the difference between matrix M and matrix M_{ref} is minimized.

CLAIMS

1. A method for normalizing laboratory instruments with pure dyes, comprising:
 - providing at least one reference instrument and a test instrument, each instrument comprising at least one excitation filter and at least one emission filter arranged in pairs;
 - providing a plurality of pure dyes, each dye comprising a fluorescent component and contained in a pure dye plate comprising a plurality of wells;
 - generating fluorescent spectra from the reference instrument and the test instrument for multiple pure dyes across multiple filter combinations;
 - creating a pure dye matrix, M_{ref} , for the reference instrument and a pure dye matrix, M , for the test instrument;
 - calculating correction factors for each filter pair and multiplying the correction factors by the pure dye spectra;
 - normalizing the corrected pure dye spectra;
 - generating multicomponent data.
2. The method of claim 1, wherein the fluorescent spectra from the test and reference instruments are each normalized to a maximum of 1.
3. The method of claim 2, wherein each pure dye matrix comprises normalized spectra averaged over multiple wells.
4. The method of claim 1, wherein dye matrix M is multiplied by a set of adjustment factors and compared to dye matrix M_{ref} .
5. The method of claim 4, wherein the adjustment factors are iteratively modified until the difference between matrix M and matrix M_{ref} is minimized.
6. The method of claim 4, wherein the adjustment factors are iteratively modified between 0 and 1.
7. The method of claim 1, wherein the correction factor for each filter pair is the product of an emission filter factor and an excitation filter factor.
8. The method of claim 1, wherein the corrected pure dye spectra are normalized to a maximum of 1.

9. The method of claim 1, wherein the multicomponent data is the product of the fluorescence data and the pseudo-inverse of dye matrix M.
10. A system for normalizing laboratory instruments with pure dyes, the system comprising:
a pure dye reference matrix, Mref;
a plurality of instruments, each comprising:
a plurality of filter pairs; and
at least one pure dye plate;
a computer system in communication with the plurality of instruments comprising:
at least one processor; and
at least one computer-readable medium comprising instructions for pure dye normalization executable by the processor to perform processing comprising:
calculating correction factors for each filter pair;
multiplying the correction factors by pure dye spectra; and
normalizing the corrected pure dye spectra.
11. The system of claim 10, wherein the filter pairs each comprise an excitation filter and an emission filter.
12. The system of claim 10, wherein the pure dye plate comprises at least one fluorescent pure dye contained in a sample plate comprising a plurality of sample wells.
13. The system of claim 10, wherein the instructions for pure dye normalization executable by the processor comprise instructions designed to generate a test spectra matrix M.
14. The system of claim 13, wherein matrix Mref and matrix M comprise normalized and averaged spectra.
15. The system of claim 13, wherein the instructions for pure dye normalization executable by the processor further comprise instructions designed to iteratively adjust matrix M until the difference between matrix M and matrix Mref is minimized.
16. The system of claim 15, wherein the instructions for pure dye normalization executable by the processor further comprise instructions designed to modify matrix M based on correction factors for each filter pair.