CLAIMS

1. A fluorescence standard, comprising

an adhesive;

a selected quantity of substantially non-photobleaching fluorescent particles dispersed in the adhesive; and

a sample well having the adhesive and the substantially non-photobleaching fluorescent particles disposed therein, wherein the adhesive is cured and solidified after being disposed in the sample well.

2. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles are one or more of quantum dots, powdered fluorescent glass, or fluorescent plastic.

3. The fluorescence standard of claim 1, wherein the adhesive is a low viscosity, substantially optically transparent, solvent-free, radiation curable adhesive.

4. The fluorescence standard of claim 1, wherein the adhesive in a UV curable adhesive.

5. The fluorescence standard of claim 1, wherein the adhesive has a viscosity of 10-100 centipoise at 15-25 °C.

6. The fluorescence standard of claim 1, wherein the adhesive has a viscosity of 15-25 centipoise at 15-25 °C.

7. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles are evenly dispersed in the adhesive before and after curing.

8. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles are included in the adhesive at a concentration adapted for providing a defined emission intensity at a selected wavelength and excitation intensity.

9. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles are quantum dots and are included in the adhesive at a concentration of about 0.01 μg/ml to about 10 μg/ml.

10. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles are quantum dots and are included in the adhesive at a concentration of about 0.05 μg/ml to about 1 μg/ml.

11. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles are quantum dots and are included in the adhesive at a concentration of about 0.075 μg/ml to about 0.2 μg/ml.

12. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles absorb and emit light in the range of about 350 nm to 850 nm.

13. The fluorescence standard of claim 12, wherein the substantially non-photobleaching fluorescent particles include at least a first quantum dot having a green emission wavelength.

14. The fluorescence standard of claim 13, wherein the substantially non-photobleaching fluorescent particles include at least a second quantum dot having a red emission wavelength.

15. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles are a mixture of different substantially non-photobleaching fluorescent particles of at least two different colors such that the mixture has a combined emissions spectrum that substantially matches an emissions spectrum of a selected fluorophore.

16. The fluorescence standard of claim 15, wherein the mixture is determined by solving for an over-determined set of equations, wherein

$$Y = AX$$

and X is determined by solving for X using the least squares method:

$$X = (A^T A)^{-1} A^T Y$$

wherein:

T indicates a matrix transpose,

X is a vector solution, representing an optical concentration for each of the different substantially non-photobleaching fluorescent particles,

Y is the vector of the spectra of the substantially non-photobleaching fluorescent particle that is to be approximated, and

A is a matrix comprised of basis vectors for each of the different substantially non-photobleaching fluorescent particles.

17. The fluorescence standard of claim 1, wherein the substantially non-photobleaching fluorescent particles include at least a first quantum dot that absorbs in a range of about 450 nm to about 550 nm and that emits in a range of about 500 nm to 630 nm.

18. The fluorescence standard of claim 16, wherein the substantially non-photobleaching fluorescent particles include at least a second quantum dot that absorbs in a range of about 550 nm to about 650 nm and that emits in a range of about 630 nm to 720 nm.

19. The fluorescence standard of claim 1, wherein the sample well is one well of a multi-well plate comprising the sample well and a plurality of additional sample wells, and each of the additional sample wells also comprises adhesive and the substantially non-photobleaching fluorescent particles disposed therein, wherein the adhesive is cured and solidified after being disposed in the additional sample wells.

20. A multi-well fluorescence standard, comprising

an adhesive;

a selected quantity of substantially non-photobleaching fluorescent particles dispersed in the adhesive; and

a multi-well format plate having a plurality of sample wells, wherein at least one sample well of the multi-well format plate has a selected quantity of the adhesive and the substantially non-photobleaching fluorescent particles disposed therein, and wherein the adhesive is cured and solidified after being disposed in the at least one sample well.

21. The multi-well fluorescence standard of claim 20, wherein the adhesive is a low viscosity, substantially optically transparent, solvent-free, radiation curable adhesive.

22. The multi-well fluorescence standard of claim 21, wherein the adhesive is a UV curable adhesive.

23. The multi-well fluorescence standard of claim 20, wherein the multi-well format plate is a 96-well plate.

24. The multi-well fluorescence standard of claim 20, wherein the multi-well format plate is a second-stage array of a FilmArray pouch.

25. The multi-well fluorescence standard of claim 20, wherein the substantially non-photobleaching fluorescent particles are included in the adhesive in each of the wells of the multi-well format plate at a concentration adapted for providing a defined emission intensity at a selected wavelength and excitation intensity.

26. The multi-well fluorescence standard of claim 25, wherein each well of the multi-well format plate includes substantially the same volume of the adhesive and substantially the same amount of the substantially non-photobleaching fluorescent particles.

27. The multi-well fluorescence standard of claim 25, wherein each well of the multi-well format plate is adapted for providing substantially the same emission intensity at a selected wavelength and excitation intensity.

28. The multi-well fluorescence standard of claim 20, wherein the substantially non-photobleaching fluorescent particles absorb and emit light in the range of about 350 nm to 850 nm.

29. The multi-well fluorescence standard of claim 28, wherein the substantially non-photobleaching fluorescent particles include at least a first quantum dot having a green emission wavelength.

30. The multi-well fluorescence standard of claim 29, wherein the substantially non-photobleaching fluorescent particles include at least a second quantum dot having a red emission wavelength.

31. The multi-well fluorescence standard of claim 20, wherein the substantially non-photobleaching fluorescent particles include at least a first quantum dot that absorbs in a range of about 450 nm to about 550 nm and that emits in a range of about 500 nm to 630 nm.

32. The multi-well fluorescence standard of claim 31, wherein the substantially non-photobleaching fluorescent particles include at least a second quantum dot that absorbs in a range of about 550 nm to about 650 nm and that emits in a range of about 630 nm to 720 nm.

33. A fluorescence standard, comprising

an adhesive;

a selected quantity of substantially non-photobleaching fluorescent particles dispersed in the adhesive; and

a sheet comprised of the adhesive and the quantum dots, wherein the adhesive is cured and solidified after being disposed in the sheet.

34. A fluorescence standard, comprising

an adhesive;

a selected quantity of substantially non-photobleaching fluorescent particles dispersed in the adhesive;

a sample well having the adhesive and the substantially non-photobleaching fluorescent particles disposed therein, wherein the adhesive is cured and solidified after being disposed in the sample well; and

a storage container for storing the fluorescence standard, wherein the storage container is configured to exclude light.

35. The fluorescence standard of claim 35, wherein the storage container comprises and aluminized mylar film.

36. The fluorescence standard of claim 35, wherein the sample well comprises a 96-well plate and the fluorescence standard is contained in more than one well of the 96-well plate.