CLAIMS

1. A system for sequencing comprising:

an imaging system to image one or more portions of a substrate having a sample associated with a surface of the substrate; and

a processing system configured to:

initiate a first imaging cycle for the imaging system to image a portion of the substrate with the imaging system to detect one or more optical signals using, at least in part, a first fluorescently labeled nucleotide associated with the sample;

subdividing an image of the portion of the substrate into a plurality of tiles, each of the plurality of tiles comprising a plurality of imaging spots and a predetermined number of fiducials;

calculating a set of image distortion correction coefficients for each of the plurality of tiles using at least a fiducial of the predetermined number of fiducials;

initiate a second imaging cycle for the imaging system to image the portion of the substrate with the imaging system to detect one or more optical signals using, at least in part, a second fluorescently labeled nucleotide associated with the sample; and

applying the set of image distortion correction coefficients calculated for each of the plurality of tiles corresponding to each of the plurality of tiles of an image from the second imaging cycle.

2. The system of claim 1, wherein the imaging system is a line scanning system.

3. The system of claim 1, wherein the substrate comprises a rectilinear array of features.

4. The system of claim 1, wherein the substrate comprises a hexagonal array of features.

5. The system of claim 1, wherein the substrate comprises multiple planes of features, each of the multiple planes substantially perpendicular to a focusing direction of the imaging system.

6. The system of claim 1, wherein the substrate comprises an octagonal array of features.

7. The system of claim 1, wherein the first imaging cycle is a calibration imaging cycle.

8. The system of claim 7, wherein the calibration imaging cycle is performed at the beginning of a multi-cycle imaging run.

9. The system of claim 1, wherein imaging processing of the plurality of tiles is parallelized.

10. The system of claim 1, wherein the set of image distortion correction coefficients comprises a first set of distortion correction coefficients for a first color channel and a second set of distortion correction coefficients for a second color channel.

11. The system of claim 1, wherein the set of image distortion correction coefficients are calculated using an estimated affine transform.

12. The system of claim 11, wherein the estimated affine transform is estimated using, at least in part, a theoretical distance of a fiducial of the predetermined number of fiducials to an actual image distance of the fiducial.

13. The system of claim 1, wherein the set of image distortion correction coefficients correspond to a first surface, wherein a second set of image distortion correction coefficients correspond to a second surface, wherein the second surface is different from the first surface.

14. The system of claim 1, wherein the set of image distortion correction coefficients correspond to a first lane, wherein a second set of image distortion correction coefficients correspond to a second lane, wherein the second lane is different from the first lane.

15. A system for sequencing comprising:

an imaging system to image one or more portions of a substrate having a patterned array of features, each feature of the patterned array of features having a biological sample associated therewith; and

a processing system configured to:

initiate a first imaging cycle for the imaging system to image a portion of the substrate with the imaging system to detect one or more optical signals using, at least in part, a first fluorescently labeled nucleotide associated with the biological sample;

subdividing an image of the portion of the substrate into a plurality of tiles, each of the plurality of tiles comprising a plurality of imaging spots and a predetermined number of fiducials;

calculating a set of image distortion correction coefficients for each of the plurality of tiles using at least a fiducial of the predetermined number of fiducials, wherein the set of image distortion correction coefficients comprises a first set of

distortion correction coefficients for a first color channel and a second set of distortion correction coefficients for a second color channel;

initiate a second imaging cycle for the imaging system to image the portion of the substrate with the imaging system to detect one or more optical signals using, at least in part, a second fluorescently labeled nucleotide associated with the biological sample; and

applying the set of image distortion correction coefficients calculated for each of the plurality of tiles corresponding to each of the plurality of tiles of an image from the second imaging cycle.

16. The system of claim 15, wherein the biological sample comprises one or more nucleic acid sequences.

17. The system of claim 15, wherein the imaging system is a line scanning system.

18. The system of claim 15, wherein the first imaging cycle is a calibration imaging cycle.

19. The system of claim 18, wherein the calibration imaging cycle is performed at the beginning of a multi-cycle imaging run.

20. A system for sequencing comprising:

an imaging system to image one or more portions of a substrate having a patterned array of features, each feature of the patterned array of features having one or more nucleic acid sequences associated therewith; and

a processing system configured to:

initiate a calibration imaging cycle for the imaging system to image a portion of the substrate with the imaging system to detect one or more optical signals using, at least in part, a first fluorescently labeled nucleotide associated with the one or more nucleic acid sequences;

subdividing an image of the portion of the substrate into a plurality of tiles, each of the plurality of tiles comprising a plurality of imaging spots and a predetermined number of fiducials;

calculating a set of image distortion correction coefficients for each of the plurality of tiles using at least a fiducial of the predetermined number of fiducials;

initiate a second imaging cycle for the imaging system to image the portion of the substrate with the imaging system to detect one or more optical signals using, at least in part, a second fluorescently labeled nucleotide associated with the one or more nucleic acid sequences; and

applying the set of image distortion correction coefficients calculated for each of the plurality of tiles corresponding to each of the plurality of tiles of an image from the second imaging cycle.