CLAIMS

1. A method of determining corrected color values from image data acquired, during a base calling cycle, by a nucleic acid sequencer comprising an image acquisition system, one or more processors, and memory, the method comprising:

(a) obtaining an image of a substrate comprising a plurality of sites where nucleic acid bases are read, wherein the sites exhibit colors representing nucleic acid base types;

(b) measuring color values of the plurality of sites from the image of the substrate;

(c) storing the color values in a processor buffer of the sequencer's one or more processors;

(d) retrieving partially phase-corrected color values of the plurality of sites, wherein the partially phase-corrected color values were stored in the sequencer's memory during an immediately preceding base calling cycle;

(e) determining a prephasing correction from

the partially phase-corrected color values stored during the immediately preceding base calling cycle, and

the color values stored in the processor buffer; and

(f) determining the corrected color values from

the color values in the processor buffer,

the partially phase corrected values stored during the immediately preceding cycle, and

the prephasing correction.

2. The method of claim 1, further comprising using the corrected color values to make base calls for the plurality of sites.

3. The method of claim 1, further comprising determining a phasing correction for the immediately succeeding base calling cycle.

4. The method of claim 3, wherein determining the phasing correction for the immediately succeeding base calling cycle comprises analyzing

the partially phase-corrected color values stored in the sequencer's memory, and

the color values stored in the processor buffer.

5. The method of claim 3, further comprising:

producing partially phase-corrected color values for the immediately succeeding base calling cycle by applying the phasing correction to color values of the plurality of sites stored in the sequencer's memory; and

storing the partially phase-corrected color values for the immediately succeeding base calling cycle in the sequencer's memory.

6. The method of claim 1, wherein the method is performed in real time during acquisition of sequence reads by the nucleic acid sequencer.

7. The method of claim 1, wherein the color values are determined from only two channels of the sequencer.

8. The method of claim 1, wherein the substrate comprises a flow cell, wherein the flow cell is logically divided into tiles, and wherein each tile represents a region of the flow cell comprising a subset of sites, which subset is captured in a single image from the image acquisition system.

9. The method of claim 8, wherein, in operation (d), the partially phase-corrected color values were stored in tile buffers of the sequencer's memory, and wherein the tile buffers are designated for storing data representing images of individual tiles on the substrate.

10. The method of claim 8, further comprising, prior to operation (a), providing reagents to the flow cell and allowing the reagents to interact with sites to exhibit the colors representing nucleic acid base types during the base calling cycle.

11. The method of claim 1, further comprising allocating the processor buffer and a second processor buffer, wherein the second processor buffer is used to determine the corrected color values in (f).

12. A nucleic acid sequencer comprising:

an image acquisition system;

memory; and

one or more processors designed or configured to:

(a) obtain data representing an image of a substrate comprising a plurality of sites where nucleic acid bases are read, wherein the sites exhibit colors representing nucleic acid base types;

(b) obtain color values of the plurality of sites from the image of the substrate;

(c) store the color values in a processor buffer;

(d) retrieve partially phase-corrected color values of the plurality of sites for a base calling cycle, wherein the partially phase-corrected color values were stored in the memory during an immediately preceding base calling cycle;

(e) determine a prephasing correction from

the partially phase-corrected color values stored during the immediately preceding base calling cycle, and

the color values stored in the processor buffer; and

(f) determine corrected color values from

the color values in the processor buffer,

the partially phase corrected values stored during the immediately preceding cycle, and

the prephasing correction.

13. The nucleic acid sequencer of claim 12, wherein the one or more processors are further designed or configured to use the corrected color values to make base calls for the plurality of sites.

14. The nucleic acid sequencer of claim 12, wherein the one or more processors are further designed or configured to determine a phasing correction for an immediately succeeding base calling cycle.

15. The nucleic acid sequencer of claim 14, wherein the one or more processors are designed or configured to determine the phasing correction for the immediately succeeding base calling cycle by analyzing

the partially phase-corrected color values stored in the memory, and

the color values stored in the processor buffer.

16. The nucleic acid sequencer of claim 14, wherein the one or more processors are further designed or configured to:

produce partially phase-corrected color values for the immediately succeeding base calling cycle by applying the phasing correction to color values of the plurality of sites stored in the memory; and

store the partially phase-corrected color values for the immediately succeeding base calling cycle in the memory.

17. The nucleic acid sequencer of claim 12, wherein the one or more processors are designed or configured to perform (a) – (f) in real time during base calling.

18. The nucleic acid sequencer of claim 12, wherein the one or more processors are designed or configured to obtain the color values from only two channels.

19. The nucleic acid sequencer of claim 12, wherein the substrate comprises a flow cell, wherein the flow cell is logically divided into tiles, and wherein each tile represents a region of the flow cell comprising a subset of sites, which subset is captured in a single image from the image acquisition system.

20. The nucleic acid sequencer of claim 19, wherein the one or more processors are further designed or configured to, prior to operation (a), provide reagents to the flow cell and allow the reagents to interact with sites to exhibit the colors representing nucleic acid base types during the base calling cycle.

21. The nucleic acid sequencer of claim 20, wherein the one or more processors are further designed or configured to, after operation (f):

provide fresh reagents to the flow cell and allow the fresh reagents to interact with the sites to exhibit colors representing nucleic acid base types for a next base calling cycle; and

repeat operations (a)-(e) for the next base calling cycle.

22. The nucleic acid sequencer of claim 12, wherein the one or more processors are further designed or configured to allocate the processor buffer and a second processor buffer for determining the corrected color values in (f).