

Claims

1. A method comprising:
 - directing, using an objective and a first reflective surface, first autofocus light toward a sensor, the first autofocus light reflected from a first surface of a substrate;
 - preventing second autofocus light from reaching the sensor, the second autofocus light reflected from a second surface of the substrate;
 - directing, using the objective and a second reflective surface, emission light toward the sensor, the emission light originating from a sample at the substrate;
 - forming, using a lateral displacement prism, left autofocus light and right autofocus light that diverge at a predetermined angle from each other, wherein the first autofocus light comprises first left autofocus light from reflection of the left autofocus light off the first surface of the substrate, wherein the first autofocus light further comprises first right autofocus light from reflection of the right autofocus light off the first surface of the substrate, wherein the second autofocus light comprises second left autofocus light from reflection of the left autofocus light off the second surface of the substrate, and wherein the second autofocus light further comprises second right autofocus light from reflection of the right autofocus light off the second surface of the substrate;
 - wherein directing the first autofocus light toward the sensor comprises directing, using the objective and the first reflective surface, the first left autofocus light and the first right autofocus light toward the sensor; and
 - wherein preventing the second autofocus light from reaching the sensor comprises preventing the second left autofocus light and the second right autofocus light from reaching the sensor.

2. The method of claim 1, further comprising directing the first autofocus light toward the second reflective surface, the second reflective surface transparent to the first autofocus light, wherein the first reflective surface is positioned behind the second reflective surface relative to a travel direction of the first autofocus light.

3. The method of claim 2, further comprising directing also the second autofocus light toward the second reflective surface, the second reflective surface transparent to the second autofocus light, wherein the first reflective surface is transparent to the second autofocus light to prevent the second autofocus light from reaching the sensor.

4. The method of claim 1, wherein the first reflective surface is positioned on a first reflective component, wherein the second reflective surface is positioned on a second reflective component, and wherein the first reflective component is separate from the second reflective component, the method further comprising orienting the first reflective component independently of an orientation of the second reflective component.

5. The method of claim 4, wherein orienting the first reflective component comprises steering the first autofocus light on the sensor independently of a position of the emission light on the sensor.

6. The method of claim 1, wherein the substrate further comprises a third surface, wherein the left autofocus light forms third left autofocus light upon reflection off the third surface, wherein the right autofocus light forms third right autofocus light upon reflection off the third surface, the method further comprising directing, using the objective and the first reflective surface, the third left autofocus light and the third right autofocus light toward the sensor.

7. The method of any of claims 1 to 6, further comprising adjusting a distance between the objective and the substrate based on the first autofocus light.

8. A system comprising:

a substrate to hold a sample for analysis;

a sensor;

an objective;

a first reflective surface to direct first autofocus light to the sensor, the first autofocus light reflected from a first surface of the substrate and conveyed by the objective;

a second reflective surface to direct emission light to the sensor, the emission light originating from the sample and conveyed by the objective;

a structure that prevents second autofocus light from reaching the sensor, the second autofocus light reflected from a second surface of the substrate and conveyed by the objective; and

a lateral displacement prism, the lateral displacement prism forming left autofocus light and right autofocus light that diverge at a predetermined angle from each other, wherein the first autofocus light comprises first left autofocus light from reflection of the left autofocus light off the first surface of the substrate, wherein the first autofocus light further comprises first right autofocus light from reflection of the right autofocus light off the first

surface of the substrate, wherein the second autofocus light comprises second left autofocus light from reflection of the left autofocus light off the second surface of the substrate, and wherein the second autofocus light further comprises second right autofocus light from reflection of the right autofocus light off the second surface of the substrate.

9. The system of claim 8, wherein the first reflective surface is positioned behind the second reflective surface relative to a travel direction of the first autofocus light, and wherein the second reflective surface is transparent to the first autofocus light.

10. The system of claim 9, wherein the first reflective surface is positioned on a first reflective component, wherein the second reflective surface is positioned on a second reflective component, and wherein the first reflective component is separate from the second reflective component.

11. The system of claim 9, wherein the second reflective surface is positioned on a front surface of a reflective component relative to the travel direction of the first autofocus light, wherein the first reflective surface covers a first portion of a rear surface of the reflective component relative to the travel direction of the first autofocus light, and wherein the structure covers a second portion of the rear surface of the reflective component.

12. The system of claim 8, wherein the lateral displacement prism includes exit surfaces having a non-zero angle relative to each other.

13. The system of claim 8, wherein the lateral displacement prism comprises:
a first surface;
a second surface that is parallel to the first surface;
a third surface;
a fourth surface;
a fifth surface having a boundary with the fourth surface, wherein each of the fourth surface and the fifth surface forms a common angle with the third surface; and
a partially reflective layer extending between the third surface and the boundary of the fourth surface and the fifth surface.

14. The system of claim 13, wherein:

the first surface has boundaries with the third surface, the fourth surface, and the fifth surface; and

the second surface has boundaries with the third surface, the fourth surface, and the fifth surface.

15. The system of any of claims 13 to 14, wherein the third surface is an entry surface, wherein the fourth surface is an exit surface for the left autofocus light, and wherein the fifth surface is an exit surface for the right autofocus light.

16. The system of claim 8, wherein the lateral displacement prism comprises:

a first prism having a first wedge profile, the first wedge profile including a first side forming a non-zero angle with regard to a first exit side;

a second prism having a second wedge profile, the second wedge profile including a second side forming a non-zero angle with regard to a second exit side; and

a third prism having a parallelogram profile, the parallelogram profile including a third side parallel to a fourth side, and a fifth side parallel to a sixth side, the third side of the parallelogram profile being part of an entry surface of the lateral displacement prism;

wherein each of the first side of the first prism and the second side of the second prism faces toward the fourth side of the third prism.

17. The system of any of claims 8 to 16, configured for analysis of nucleic material at the substrate.