

WHAT IS CLAIMED IS:

1. An image sensor comprising:
a plurality of unit pixels; and
a color filter array on the plurality of unit pixels,
wherein the color filter array comprises a color filter unit comprising four color filters
that are arranged in a two-by-two array, and
wherein the color filter unit comprises two yellow color filters, a cyan color filter, and
a red color filter.

2. The image sensor of claim 1, wherein a first row of the two-by-two array of
the color filter unit comprises the cyan color filter and a first one of the two yellow color
filters, and
wherein a second row of the two-by-two array of the color filter unit comprises a
second one of the two yellow color filters that is adjacent to the first one of the two yellow
color filters in a diagonal direction with respect to a row direction.

3. The image sensor of claim 1 or claim 2, wherein the color filter array
comprises a plurality of color filter units that comprises a plurality of yellow color filters, a
plurality of cyan color filters, and a plurality of red color filters, and
wherein the plurality of yellow color filters, the plurality of cyan color filters, and the
plurality of red color filters of the plurality of color filter units are in a Bayer pattern.

4. The image sensor of any one of claims 1 to 3, further comprising a substrate
comprising a first surface and a second surface opposite the first surface,
wherein each of the plurality of unit pixels comprises a photoelectric conversion
region in the substrate, and

wherein the first surface of the substrate faces the color filter array.

5. The image sensor of claim 4, wherein the substrate has a first conductivity type, and

wherein the photoelectric conversion region of each of the plurality of unit pixels has a second conductivity type different from the first conductivity type.

6. The image sensor of claim 4 or claim 5, wherein each of the plurality of unit pixels further comprises a plurality of transistors on the second surface of the substrate.

7. The image sensor of any one of claims 4 to 6, further comprising a device isolation layer in the substrate, wherein the device isolation layer isolates the plurality of unit pixels from each other.

8. The image sensor of claim 7, wherein the first surface and the second surface of the substrate are spaced apart from each other in a vertical direction, and

wherein the device isolation layer has a first width in a horizontal direction adjacent to the first surface of the substrate and has a second width in the horizontal direction adjacent to the second surface of the substrate, and the first width is different from the second width.

9. An image sensor comprising:
a color filter unit comprising two yellow color filters, a cyan color filter, and a red color filter that are in a two-by-two array:

$$\begin{bmatrix} Y & R \\ C & Y \end{bmatrix}$$

wherein Y represents one of the two yellow color filters, C represents the cyan color filter, and R represents the red color filter.

10. The image sensor of claim 9, wherein the color filter unit comprises a plurality of color filter units that are arranged two-dimensionally.

11. The image sensor of claim 9, wherein the color filter unit comprises a plurality of color filter units that comprise a plurality of yellow color filters, a plurality of cyan color filters, and a plurality of red color filters, and

wherein the plurality of yellow color filters, the plurality of cyan color filters, and the plurality of red color filters of the plurality of color filter units are in a Bayer pattern.

12. The image sensor of any one of claims 9 to 11, further comprising a plurality of unit pixels arranged in a two-by-two array,

wherein each of the plurality of unit pixels is in one-to-one relationship with one of the yellow color filters, the cyan color filter, or the red color filter of the color filter unit,

wherein each of the plurality of unit pixels comprises:

a photoelectric conversion device;

a transfer transistor configured to control transfer of charges generated in the photoelectric conversion device; and

a floating diffusion region configured to receive the charges.

13. The image sensor of claim 12, further comprising a substrate, wherein the photoelectric conversion device comprises a photoelectric conversion region in the substrate,

wherein the substrate has a first conductivity type, and

wherein the photoelectric conversion region has a second conductivity type that is different from the first conductivity type.

14. An image sensor comprising:

a substrate including a plurality of photoelectric conversion devices; and

a color filter unit on the substrate,

wherein the color filter unit comprises four color filters that comprise two first color filters, a second color filter, and a third color filter that are in a two-by-two array:

$$\begin{bmatrix} \text{first color filter} & \text{third color filter} \\ \text{second color filter} & \text{first color filter} \end{bmatrix},$$

wherein each of the two first color filters and the second color filter is a complementary color filter,

wherein the third color filter is a primary color filter, and

wherein the third color filter is a red color filter.

15. The image sensor of claim 14, wherein colors of the second and third color filters have a complementary relationship with each other.

16. The image sensor of claim 14 or claim 15, wherein each of the two first color filters is a yellow color filter, the second color filter is a cyan color filter.

17. The image sensor of any one of claims 14 to 16, wherein the color filter unit comprises a plurality of color filter units, and

wherein the first, second and third color filters of the plurality of color filter units are in a Bayer pattern.

18. The image sensor of any one of claims 14 to 17, wherein each of the first, second and third color filters overlaps a respective one of the plurality of photoelectric conversion devices.

19. The image sensor of any one of claims 14 to 17, wherein each of the first, second and third color filters overlaps a pair of the plurality of photoelectric conversion

devices.

20. The image sensor of any one of claims 14 to 19, wherein each of the plurality of photoelectric conversion devices comprises a photoelectric conversion region in the substrate,

wherein the substrate has a first conductivity type, and

wherein the photoelectric conversion region has a second conductivity type that is different from the first conductivity type.