

What is claimed is:

1. An image sensor, comprising:

a substrate which includes a plurality of block regions, each block region of the plurality of block regions including a separate plurality of pixel regions, each pixel region of each block region including

a separate photoelectric element of a plurality of photoelectric elements in the substrate, and

a separate micro lens of a plurality of micro lenses on the substrate, wherein each micro lens of the plurality of micro lenses is laterally offset from a vertical centerline of the pixel region towards a center of the block region,

wherein the micro lenses of the plurality of block regions are shifted in units of block regions, and each block region of the plurality of block regions includes a common shifted shape of the plurality of micro lenses of the block region such that the same pattern of micro lenses is included in each block region, and

each block region of the plurality of block regions includes separate color regions which receive beams of different colors.

2. The image sensor of claim 1, wherein at least one block region of the plurality of block regions has a square shape.

3. The image sensor of claim 1 or claim 2, wherein at least one block region of the plurality of block regions has a rectangle shape.

4. The image sensor of any one of claims 1 to 3, wherein

the plurality of block regions includes a first block region,

the plurality of pixel regions of the first block region includes a first pixel region and a second pixel region,

the first pixel region is isolated from direct contact with the center of the first block region by a first distance,

the second pixel region is isolated from direct contact with the center of the first block region by a second distance, the second distance greater than the first distance,

the plurality of micro lenses includes a first micro lens and a second micro lens, the first micro lens located in the first pixel region, the second micro lens located in the second pixel region,

the first micro lens is laterally offset from a vertical centerline of the first pixel region by a first interval towards a center of the first block region,

the second micro lens is laterally offset from a vertical centerline of the second pixel region by a second interval towards the center of the first block region, and

the first interval is smaller than the second interval.

5. The image sensor of claim 4, wherein

the plurality of block regions includes a second block region,

the second block region includes a third pixel region,

the third pixel region is isolated from direct contact with the center of the second block region by the first distance,

the plurality of micro lenses includes a third micro lens located in the third pixel region, and

the third micro lens is laterally offset from a vertical centerline of the third pixel region by the first interval towards the center of the second block region.

6. The image sensor of any one of claims 1 to 5, further comprising:

a color filter layer between the substrate and the plurality of micro lenses.

7. The image sensor of any one of claims 1 to 6, further comprising:

a control circuit configured to receive electrical signals generated by the plurality of photoelectric elements.

8. The image sensor of claim 7, wherein the control circuit is configured to selectively execute one mode of

a full mode such that the control circuit uses all of the electrical signals generated by the plurality of photoelectric elements, or

a binning mode such that the control circuit uses a limited portion of the electrical signals generated by the plurality of photoelectric elements.

9. The image sensor of claim 8, wherein
the plurality of block regions includes first to third color regions which are configured to receive beams of different colors, and
the control circuit is configured to selectively execute the binning mode such that each block region of the plurality of block regions utilizes only one color region of the first to third color regions.
10. The image sensor of claim 9, wherein the first color region is a red color region, the second color region is a green color region, and the third color region is a blue color region.
11. A fingerprint sensing system, comprising:
a display panel; and
an image sensor according to any one of claims 1 to 10,
wherein the display panel is on the plurality of micro lenses.
12. An image sensor, comprising:
a substrate, the substrate including a first block region and a second block region, the first block region including a first pixel region and a second pixel region, and the second block region including a third pixel region and a fourth pixel region, the first through fourth pixel regions including
first to fourth photoelectric elements in separate, respective pixel regions of the first to fourth pixel regions; and
first to fourth micro lenses on separate, respective pixel regions of the first to fourth pixel regions,
wherein
a distance between a vertical centerline of the first pixel region and a center of the first block region is a first distance,
a distance between a vertical centerline of the second pixel region and the center of the first block region is a second distance,
a distance between a vertical centerline of the third pixel region and a center of the second block region is the first distance,

a distance between a vertical centerline of the fourth pixel region and the center of the second block region is the second distance,
the first micro lens is laterally offset from the vertical centerline of the first pixel region by a first interval towards the center of the first block region,
the second micro lens is laterally offset from the vertical centerline of the second pixel region by a second interval towards the center of the first block region,
the third micro lens is laterally offset from the vertical centerline of the third pixel region by the first interval towards the center of the second block region,
the fourth micro lens is laterally offset from the vertical centerline of the fourth pixel region by the second interval towards the center of the second block region, and
each of the first block region and the second block region includes separate color regions which receive beams of different colors.

13. The image sensor of claim 12, wherein the first block region and the second block region include common quantities of pixel regions.

14. The image sensor of claim 13, wherein the first and second block regions each include pixel regions aligned as a common quantity of rows and a common quantity of columns.

15. The image sensor of any one of claims 12 to 14, further comprising:
a color filter layer between the substrate and the first through fourth micro lenses.

16. The image sensor of claim 15, wherein the color filter layer has any one of a red color, a blue color, or a green color.