WHAT IS CLAIMED IS:

1. A lens comprising:

an optical center and an optical axis passing through the optical center; and

one or more lens portions;

wherein the one or more lens portions comprise at least a first lens portion for refracting light rays of a predefined polarization state impinging at right angle thereto from a first side towards the optical axis on a second side at a constant bending angle thereby defining a focal line on the second side along the optical axis.

2. The lens of claim 1, wherein the at least first lens portion is positioned at a distance away from the optical center.

3. The lens of claim 1 or 2, wherein the at least first lens portion comprises the first lens portion and a second lens portion;

wherein centers of the first and second lens portions are on diagonally opposite sides of the optical center; and

wherein the first and second lens portions are configured for passing therethrough the light rays of orthogonal polarization states.

4. The lens of any one of claims 1 to 3, wherein the one or more lens portions further comprise:

at least a third lens portion for refracting light rays impinging at the constant bending angle thereto from the focal line on the second side to the first side at a direction parallel to the optical axis.

5. The lens of claim 4, wherein the at least a third lens portion comprises the third lens portion and a fourth lens portion;

wherein centers of the third and fourth lens portions are on diagonally opposite sides of the optical center; and

wherein the third and fourth lens portions are configured for passing therethrough the light rays of orthogonal polarization states.

6. The lens of claim 5, wherein, for a two-dimensional (2D) coordinate system defined on the lens with the origin thereof at the optical center, each of the one or more lens portions is positioned in a respective quadrant of the 2D coordinate system.

7. The lens of claim 6, wherein centers of each circumferentially neighboring pair of the one or more lens portions are at right angle with respect to the optical center.

8. The lens of any one of claims 1 to 7, wherein the bending angle is 21°.

9. The lens of any one of claims 1 to 8, wherein each of the one or more lens portions comprises a metasurface coupled to a substrate.

10. The lens of claim 9, wherein each metasurface comprises a plurality of nano-pillars in a pattern of arcs, said arcs being portions of a plurality of concentric circles centered at the optical center.

11. The lens of any one of claims 1 to 10 further comprising:
an axicon with the vertex thereof being the optical center;
wherein the one or more lens portions are defined on the axicon.

12. An imaging apparatus comprising:
a polarizing beam splitter for splitting a light ray into a first polarized light ray and a second polarized light ray of orthogonal polarization states;
a beam conditioning module for receiving the first and second polarized light rays and outputting the first and second polarized light rays to the lens of any one of claims 1 to 11; and
an adjustment module for introducing time delay to and/or for adjusting frequency of at least one of the first and second polarized light rays before the first and second polarized light rays are input into the beam conditioning module.

13. A method of fabricating the lens of any one of claims 1 to 11, the method comprising:
depositing an amorphous silicon (a-Si) layer is on the substrate using a plasma-enhanced chemical vapor deposition;
coating a layer of negative tone photoresist on the a-Si layer;
using electron beam lithography (EBL) to create an etching pattern on the layer of negative tone photoresist; and
using deep reactive ion etching to generate a-Si nano-pillars for forming the metasurfaces of the one or more lens portions.

14. A method of using the lens of claim 5, the method comprising at least one of:
aiming a first light beam to the first lens portion; and
collecting a third light beam and a fourth light beam from the third lens portion and the fourth lens portion, respectively;
wherein the first light beam has a cross-sectional size matching a size of the first lens portion.

15. A lens comprising:
an optical center and an optical axis passing through the optical center; and
a plurality of lens portions comprising a first lens portion and a second lens portion on diagonally opposite first and second quadrants of a plane perpendicular to the optical axis for refracting light rays from a first side to a second side, and a third lens portion on a third quadrant of the plane for refracting light rays from the second side to the first side;
wherein the first and second lens portions are configured for refracting light rays impinging at right angle thereto from the first side towards the optical axis on the second side at a constant bending angle thereby defining a focal line on the second side along the optical axis, and the third lens portion is configured for refracting light rays impinging from the focal line on the second side at the constant bending angle thereto to the first side parallel to the optical axis; or

wherein the third lens portion is configured for refracting light rays impinging at right angle thereto from the second side towards the optical axis on the first side at the constant bending angle thereby defining the focal line on the first side along the optical axis, and the first and second lens portions are configured for refracting light rays impinging from the focal line on the first side at the constant bending angle thereto to the second side parallel to the optical axis.

16. The lens of claim 15, wherein the plurality of lens portions are away from the optical center.

17. The lens of claim 15 or 16, wherein the plurality of lens portions further comprises:

a fourth lens portion on a fourth quadrant of the plane for refracting light rays impinging from the focal line on the second side at the constant bending angle thereto to the first side parallel to the optical axis; or for refracting light rays impinging at right angle thereto from the second side towards the optical axis on the first side at the constant bending angle thereby towards the focal line on the first side.

18. The lens of any one of claims 15 to 17, wherein the bending angle is 21°.

19. The lens of any one of claims 15 to 18, wherein each of the one or more lens portions comprises a metasurface coupled to a substrate.

20. The lens of any one of claims 15 to 19, wherein the lens comprises an axicon with the vertex thereof being the optical center; and

wherein the one or more lens portions are defined on the axicon.

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