CLAIMS

1. A spatial light modulator comprising:

   a first electrode arrangement;

   a second electrode arrangement;

   a liquid crystal layer between the first electrode arrangement and the second electrode arrangement; and

   one or more nanoantennas in contact with the liquid crystal layer;

   wherein the first electrode arrangement and the second electrode arrangement are each configured to allow at least a portion of light to pass through, and

   wherein a height of each of the one or more nanoantennas is equal to a thickness of the liquid crystal layer.

2. The spatial light modulator according to claim 1,

   wherein the liquid crystal layer is configured to switch liquid crystal directors between a first state and a second state; and

   wherein the one or more nanoantennas are configured to act as Huygens' sources in at least one state selected from the first state and the second state.

3. The spatial light modulator according to claim 1,

   wherein a thickness of the liquid crystal layer is smaller than a vacuum wavelength (λ_0) of the light.

4. The spatial light modulator according to claim 1,

   wherein the first electrode arrangement and the second electrode arrangement are transparent.

5. The spatial light modulator according to claim 1,

   wherein the one or more nanoantennas comprise a dielectric material or a semiconductor material.

6. The spatial light modulator according to claim 1,

wherein the one or more nanoantennas comprise any one material selected from a group consisting of titanium oxide, silicon, germanium, gallium nitride, gallium phosphide, indium phosphide, gallium arsenide, silicon nitride, and copper oxide.

7. The spatial light modulator according to claim 1,

wherein the one or more nanoantennas are each of a shape selected from a cylinder, a cuboid, a cross, a ring, and a c-shape.

8. The spatial light modulator according to claim 1,

wherein the spatial light modulator has a plurality of pixels.

9. The spatial light modulator according to claim 1,

wherein the first electrode arrangement and the second electrode arrangement comprise a transparent conducting oxide.

10. The spatial light modulator according to claim 1,

wherein the first electrode arrangement comprises a single electrode;

wherein the second electrode arrangement comprises a single electrode.

11. The spatial light modulator according to claim 1,

wherein the first electrode arrangement comprises a single electrode; and

wherein the second electrode arrangement comprises a plurality of electrodes.

12. The spatial light modulator according to claim 1,

wherein the first electrode arrangement comprises a plurality of electrodes; and

wherein the second electrode arrangement comprises a single electrode.

13. The spatial light modulator according to claim 1,

wherein the first electrode arrangement is over the second electrode arrangement.

14. The spatial light modulator according to claim 1, further comprising:

a first substrate in contact with the first electrode arrangement; and

a second substrate in contact with the second electrode arrangement.

15. The spatial light modulator according to claim 14,

wherein the first substrate and the second substrate each comprises silicon dioxide or soda lime glass.

16. The spatial light modulator according to claim 1,

wherein the liquid crystal layer comprises a plurality of uniaxial anisotropic liquid crystals;

wherein the plurality of uniaxial anisotropic liquid crystals are each configured to change orientation upon application of different voltages between the first electrode arrangement and the second electrode arrangement.

17. The spatial light modulator according to claim 1,

wherein the spatial light modulator is a binary phase-only modulator and/or an amplitude-only modulator.

18. The spatial light modulator according to claim 1,

wherein the one or more nanoantennas are disposed within the liquid crystal layer.

19. A method of forming a spatial light modulator, the method comprising:

forming a first electrode arrangement;

forming a second electrode arrangement;

forming a liquid crystal layer between the first electrode arrangement and the second electrode arrangement; and

forming one or more nanoantennas in contact with the liquid crystal layer;

wherein the first electrode arrangement and the second electrode arrangement are each configured to allow at least a portion of light to pass through, and

wherein a height of each of the one or more nanoantennas is equal to a thickness of the liquid crystal layer.

20. The spatial light modulator according to claim 1,

wherein the one or more nanoantennas are of a cylindrical shape, and

wherein a diameter of one or more nanoantennas is greater than the height of the one or more nanoantennas.