CLAIMS

1. A device for controlling an electromagnetic wave, the device comprising: a medium; and an array of elements in contact with the medium and configured to receive the electromagnetic wave; wherein each element of the array of elements comprises a phase change material configured to switch from, at least, a first state to a second state in response to an external input, thereby changing an optical property of the respective element to control the electromagnetic wave.

2. The device according to claim 1, wherein the medium is a substrate or a superstrate.

3. The device according to claim 1, wherein the external input is an electrical signal, a thermal signal or an optical signal.

4. The device according to claim 1, wherein the phase change material is configured to switch from the second state to a third state in response to a further external input, thereby further changing the optical property of the respective element.

5. The device according to claim 1, wherein the first state is an amorphous phase and the second state is a phase that is at least partially crystallized.

6. The device according to claim 1, wherein the array of elements is a periodic array.

7. The device according to claim 1, wherein the electromagnetic wave is an infrared light.

8. The device according to claim 1, wherein a period between neighbouring elements of the array of elements is below 5 μm.

9. The device according to claim 1, wherein controlling the electromagnetic wave comprises adjusting the scattering of the electromagnetic wave.

10. The device according to claim 1, wherein the electromagnetic wave is controlled by changing at least one property of the electromagnetic wave selected from a group consisting of phase, amplitude, and polarization.

11. The device according to claim 1, wherein the optical property of the respective element is a refractive index of the respective element.

12. The device according to claim 1, wherein the phase change material is Ge.sub.2Sb.sub.2Tb.sub.5.

13. The device according to claim 1, wherein each element is a nanostructure.

14. An arrangement comprising: a device configured to control an electromagnetic wave, the device comprising: a medium; and an array of elements in contact with the medium and configured to receive the electromagnetic wave; and an electromagnetic wave source configured to provide the electromagnetic wave to the array of elements; wherein each element of the array of elements comprises a phase change material configured to switch from, at least, a first state to a second state in response to an external input, thereby changing an optical property of the respective element to control the electromagnetic wave.

15. The arrangement according to claim 14, wherein the external input is a laser beam; and wherein the arrangement further comprises: a laser source configured to emit the laser beam; and a spatial light modulator configured to direct the laser beam to the respective element to change the optical property of the respective element.

16. A method of forming a device for controlling an electromagnetic wave, the method comprising: providing a medium; and forming an array of elements in contact with the medium and configured to receive the electromagnetic wave; wherein each element of the array of elements comprises a phase change material configured to switch from, at least, a first state to a second state in response to an external input, thereby changing an optical property of the respective element to control the electromagnetic wave.

17. A method of forming an arrangement, the method comprising: providing a device configured to control an electromagnetic wave, the device comprising: a medium; and an array of elements in contact with the medium and configured to receive the electromagnetic wave; wherein each element of the array of elements comprises a phase change material configured to switch from, at least, a first state to a second state in response to an external input, thereby changing an optical property of the respective element to control the electromagnetic wave; and providing an

electromagnetic wave source configured to provide the electromagnetic wave to the array of elements.

18. A method of operating a device to control an electromagnetic wave, the method comprising: providing the electromagnetic wave to the device, the device comprising: a medium; and an array of elements in contact with the medium and configured to receive the electromagnetic wave, each element of the array of elements comprising a phase change material; and applying the external input to switch the phase change material from, at least, a first state to a second state, thereby changing an optical property of the respective element to control the electromagnetic wave received by the array of elements.

19. The method according to claim 18, wherein the electromagnetic wave is controlled by adjusting a phase of the electromagnetic wave from 0 radian to 2π radians.

20. A method of operating an arrangement to control an electromagnetic wave, the method comprising: providing a device configured to control the electromagnetic wave, the device comprising: a medium; and an array of elements in contact with the medium and configured to receive the electromagnetic wave, each element of the array of elements comprising a phase change material; providing an electromagnetic source to provide the electromagnetic wave to the device; and applying the external input to switch the phase change material from the first state to the second state, thereby changing an optical property of the respective element to control the electromagnetic wave received by the array of elements.