WHAT IS CLAIMED IS:

1. A meta-surface device comprising:

a substrate;

a pattern of high-index pillars formed on the substrate; and

a coating of low-index material overlapping with the high-index pillars, wherein the coating of low-index material has a lower refractive index than the high-index pillars, and wherein the coating of low-refractive index material is coated only on top surfaces of the high-index pillars.

2. The meta-surface device of claim 1,

wherein the pattern of high-index pillars comprises silicon, germanium, gallium phosphorus, gallium arsenic, gallium antimony, indium phosphorus, indium arsenic, indium antimony, titanium oxide, silicon nitride, or germanium-antimony-tellurium; and

wherein the coating of low-index material comprises aluminum oxide, silicon oxide, magnesium oxide, magnesium fluoride, silicon nitride, or hafnium oxide.

3. The meta-surface device of claim 1, wherein the high-index pillars are surrounded by a low-index encapsulation material.

4. The meta-surface device of claim 1, wherein the coating of low-index material comprises a multi-layer low-index material.

5. The meta-surface device of claim 4, wherein the multi-layer low-index material comprises two or more layers of low-index material each having a refractive index lower than the high-index pillars.

6. The meta-surface device of claim 1, wherein the substrate comprises lower refractive index than the refractive index of the high-index pillars.

7. The meta-surface device of claim 1, wherein the coating of low-refractive index material is located on a side of the high-index pillars opposite to the substrate.

8. The meta-surface device of claim 1, wherein the coating of low-refractive index material is located between the high-index pillars and the substrate.

9. The meta-surface device of claim 1, wherein the coating of low-refractive index material is located both on a side of the high-index pillars opposite to the substrate and between the high-index pillars and the substrate.

10. The meta-surface device of claim 1, wherein the coating of low-refractive index material is conformally coated on the top and side surfaces of the high-index pillars.

11. The meta-surface device of claim 1, wherein the high-index pillars each reside within a plurality of openings in the substrate.

12. The meta-surface device of claim 11, wherein the low-index coating is conformally coated on the substrate including the plurality of openings.

13. The meta-surface device of claim 12, wherein portions of the low-index coating are between the substrate and the high-index pillars.

14. The meta-surface device of claim 1, wherein the coating of low-refractive index material comprises one or more transverse dimensions about equal to one or more transverse dimensions of the high-index pillars.

15. The meta-surface device of claim 1, wherein the high-index pillars comprise a semiconductor or chalcogenide material and the coating of low-refractive index material comprises a lower index dielectric or oxide.

16. The meta-surface device of claim 1, wherein the coating of low-refractive index material has a refractive index between 1.46 and 2.1.

17. The meta-surface device of claim 16, wherein the high-index pillars have a refractive index above 1.8.

18. The meta-surface device of claim 17, wherein the high-index pillars have a refractive index above 2.5.

19. The meta-surface device of claim 1, wherein the coating of low-index material is in direct contact with the high-index pillars.

20. The meta-surface device of claim 19, wherein the coating of low-refractive index material is coated only on top surfaces of the high-index pillars.

21. The meta-surface device of claim 20, further comprising a low-index encapsulation material, wherein the low-index coating is positioned between the low-index encapsulation material and the high-index pillars.

22. The meta-surface device of claim 21, further comprising a second low-index coating located between the high-index pillars and the substrate.