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 coating of low-refractive index material is coated only on top surfaces of the high-index pillars.~~

~~12~~11. The meta-surface device of claim 1, wherein the high-index pillars each reside within a plurality of openings in the substrate.

~~13~~12. The meta-surface device of claim ~~12~~11, wherein the low-index coating is conformally coated on the substrate including the plurality of openings.

~~14~~13. The meta-surface device of claim ~~13~~12, wherein portions of the low-index coating are between the substrate and the high-index pillars.

~~15~~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.

~~16~~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.

~~17~~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.

~~18~~17. The meta-surface device of claim ~~17~~16, wherein the high-index pillars have a refractive index above 1.8.

~~19~~18. The meta-surface device of claim ~~18~~17, wherein the high-index pillars have a refractive index above 2.5.

~~20~~19. The meta-surface device of claim 1, wherein the coating of low-index material is in direct contact with the high-index pillars.

~~21~~20. The meta-surface device of claim ~~20~~19, wherein the coating of low-refractive index material is coated only on top surfaces of the high-index pillars.

~~22~~21. The meta-surface device of claim ~~21~~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.

~~23~~22. The meta-surface device of claim ~~22~~21, further comprising a second low-index coating located between the high-index pillars and the substrate.

~~24. The meta-surface device of claim 23, wherein the second low-index coating is a continuous layer coating the substrate directly contacting the high index pillars and the encapsulation media.~~

~~25. The meta-surface device of claim 1, further comprising a low-index encapsulation material positioned between the high-index pillars and the low-index coating.~~

~~26. The meta-surface device of claim 25, wherein the low-index coating is a continuous layer coated over the low-index encapsulation material.~~

~~27. The meta-surface device of claim 25, further comprising a second low-index coating located between the high-index pillars and the substrate.~~

~~28. The meta-surface device of claim 27, wherein the second low-index coating is a continuous layer coating the substrate.~~

~~29. The meta-surface device of claim 28, wherein the low-index coating comprises a first top low-index coating and a second top low-index coating, and wherein the second low-index coating comprises a first bottom low-index coating and a second bottom low-index coating.~~

~~30. The meta-surface device of claim 29, wherein the first top low-index coating comprises a thickness of 25nm-55nm and the second top low-index coating comprises a thickness of 70nm-35nm.~~

~~31. The meta-surface device of claim 30, wherein the first bottom low-index coating comprises a thickness of 160nm-185nm and the second bottom low-index coating comprises a thickness of 100nm-135nm.~~

~~32. The meta-surface device of claim 29, wherein the low-index coating further comprises a third top low-index coating and a fourth top low-index coating, and wherein the second low-index coating comprises a third bottom low-index coating and a fourth bottom low-index coating.~~

~~33. The meta-surface device of claim 1, wherein the coating of low-index material provides anti-reflection properties for the high-index pillars.~~

~~34. A method of fabricating a meta-surface device, the method comprising:~~

~~providing a substrate;~~

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

~~coating the high-index pillars with a low-index coating using a self-aligning deposition process.~~

~~35. The method of claim 34, wherein the self-aligning deposition process comprises conformally coating the high-index pillars.~~

~~36. The method of claim 34, further comprising depositing a low index encapsulation media over the high-index pillars.~~

~~37. The method of claim 36, wherein the low index encapsulation media is deposited before coating the high-index pillars such that the low-index coating is positioned above the low index encapsulation media.~~

~~38. The method of claim 37, wherein the low index encapsulation media is deposited after coating the high-index pillars such the low index encapsulation media directly contacts a top surface of the low-index coating and the sidewalls of the high-index pillars.~~

~~39. The method of claim 34, wherein the self-aligning deposition process comprises depositing a high-index layer and one or more low-index layers on top of the high index layer, etching the high-index layer and the one or more low-index layers leaving the high-index pillars and the low-index coating which forms a cap on the high-index pillars.~~

~~40. A method of fabricating a meta-surface device, the method comprising:~~

~~providing a substrate, wherein the substrate comprises a plurality of openings;~~

~~coating the surface of the substrate, including the inside of the plurality of openings with a low-index coating; and~~

~~depositing a pattern of high-index pillars within the plurality of openings.~~

~~41. The method of claim 40, wherein the top surface of the high-index pillars is approximately coplanar with the top surface of the low-index coating.~~