~~What is claimed is~~CLAIMS:

1. A method for manufacturing one or more optical arrays, the method comprising:

(A) providing a substrate comprising a first polymer layer sensitive to a radiation;

(B) providing a single mask comprising a first mask portion configured to block the radiation and one or more second mask portions configured to allow the radiation to pass through, wherein each second mask portion in the one or more second mask portions has a first dimension in a first direction and a second dimension in a second direction, wherein the second direction is different from the first direction;

(C) positioning the substrate and the mask relative to each other at each relative position in a first plurality of relative positions along the first direction, wherein a distance between adjacent relative positions in the first plurality of relative positions is equal to or less than the first dimension of any second mask portion in the one or more second mask portions;

(D) exposing, at each respective relative position in the first plurality of relative positions, the first polymer layer through the mask to a corresponding dose in a first plurality of doses of the radiation, thereby producing one or more first exposed polymer portions in the first polymer layer;

(E) positioning the substrate and the mask relatively to each other at each relative position in a second plurality of relative positions along the second direction, wherein a distance between adjacent relative positions in the second plurality of relative positions is equal to or less than the second dimension of any second mask portion in the one or more second mask portions; and

(F) exposing, at each respective relative position in the second plurality of relative positions, the first polymer layer through the mask to a corresponding dose in a second plurality of doses of the radiation, thereby producing one or more second exposed polymer portions in the first polymer layer;

wherein each respective second exposed polymer portion in the one or more second exposed polymer portions overlaps at least partially with each corresponding first exposed polymer portion in the one or more first portions, thereby producing one or more overlapped exposed polymer portions, each overlapped exposed polymer portion creates an array of dosed segments, wherein each dosed segment in the array of dosed segments is exposed to a different dose of the radiation.

2. The method of claim 1, wherein a distance between any two relative positions in the first plurality of relative positions is equal to or less than the first dimension of any second mask portion in the one or more second mask portions, or a distance between any two relative positions in the second plurality of relative positions is equal to or less than the second dimension of any second mask portion in the one or more second mask portions.

~~3. A method for manufacturing one or more optical arrays, the method comprising:~~

~~(A1) providing a substrate comprising a first polymer layer sensitive to a radiation;~~

~~(B1) providing a single mask comprising a first mask portion configured to block the radiation and one or more second mask portions configured to allow the radiation to pass through, wherein each second mask portion in the one or more second mask portions has a first dimension in a first direction and a second dimension in a second direction, wherein the second direction is different from the first direction;~~

~~(C1) positioning the substrate and the mask relative to each other at each relative position in an array of relative positions, wherein a distance between two adjacent relative positions along the first direction is equal to in the first dimension of any second mask portion in the one or more second mask portions, and a distance between two adjacent relative positions along the second direction is equal to the second dimension of any second mask portion in the one or more second mask portions; and~~

~~(D1) exposing, at each respective relative position in the array of relative positions, the first polymer layer through the mask to a corresponding dose in an array of doses of the radiation, thereby producing one or more final exposed polymer portions in the first polymer layer, each final exposed polymer portion comprising an array of dosed segments, wherein each dosed segment in the array of dosed segments is exposed to a different dose of the radiation.~~

~~4.~~3. The method of ~~any one of preceding claims~~claim 1 or 2, further comprising:

(G) developing the first polymer layer of the substrate such that of each overlapped or final exposed polymer portion, each dosed segment in the array of dosed segments is developed to produce a first surface at a different depth in the first polymer layer, thereby creating one or more patterned structures in the first polymer layer of the substrate, each patterned structure comprising an array of first surfaces at different depths.

~~5.~~4. The method of claim 3~~4~~, wherein of a respective patterned structure in the one or more patterned structures, the depths of the array of first surfaces range from 0 to 2 μm, from 0 to 5 μm, from 0 to 10 μm, from 0 to 15 μm, from 0 to 20 μm, from 0 to 25 μm, , from 0 to 30 μm, from 0 to 50 μm, or from 0 to 100 μm.

~~6.~~5. The method of any one of claims 3~~4~~-4~~5~~, wherein of a respective patterned structure in the one or more patterned structures, at least two depths of the array of first surfaces differ from each other by at least two orders of magnitude, or by at least three orders of magnitude.

~~7.~~6. The method of any one of claims 3~~4~~-5~~6~~, further comprising:

(H) depositing a layer of a first reflective material on top of the one or more patterned structures.

~~8.~~7. The method of claim 6~~7~~, wherein the layer of the first reflective material comprises a semi-transparent aluminum film having a thickness of between 5 and 10 nm, between 10 and 15 nm, between 15 and 20 nm, between 20 and 25 nm, or between 25 and 30 nm.

~~9.~~8. The method of any one of claims 6~~7~~-7~~8~~, further comprising:

(I) overlaying a first protection layer on the layer of the first reflective material.

~~10.~~9. The method of claim 8~~9~~, wherein the first protection layer is made of a material comprising silicon dioxide (SiO2).

~~11.~~10. The method of any one of claims 8~~9~~-9~~10~~, further comprising:

(J) overlaying a second protection layer on the first protection layer.

~~12.~~11. The method of claim 10~~11~~, wherein the second protection layer is made of a material comprising a polymer.

~~13.~~12. The method of any one of claims 6~~7~~-11~~12~~, further comprising:

(K) dicing the substrate to produce one or more individual chips, each comprising a patterned structure in the one or more patterned structures.

~~14.~~13. The method of any one of claims 6~~7~~-12~~13~~, wherein the substrate comprises a glass substrate coated with a layer of second reflective material, wherein the first polymer layer

overlays the layer of second reflective material, wherein corresponding to each of the one or more patterned structures, an optical array is formed by the second reflective layer, a first reflective layer formed by the layer of first reflective material, and the first polymer layer in-between.

~~15.~~14. The method of claim 13~~14~~, wherein the first polymer layer comprises a Poly(methyl methacrylate) (PMMA) film spun on top of the coated glass substrate.

~~16.~~15. The method of any one of claims 13~~14~~-14~~15~~, wherein the layer of second reflective material comprises a semi-transparent aluminum film having a thickness of between 5 and 10 nm, between 10 and 15 nm, between 15 and 20 nm, between 20 and 25 nm, or between 25 and 30 nm.

~~17.~~16. The method of any one of claims 13~~14~~-15~~16~~, further comprising:

(L) attaching a sensor array above or under each of the one or more patterned structures, wherein the sensor array is configured to detect light transmitted through the optical array, wherein the attaching (L) is performed prior to or subsequent to the dicing (K).

~~18.~~17. The method of any one of preceding claims, wherein the radiation comprises an X-ray beam, or a UV beam.

~~19.~~18. The method of any one of the preceding claims, wherein the first polymer layer has a thickness between 2 and 5 μm, between 5 and 10 μm, between 10 and 15 μm, between 15 and 20 μm, between 20 and 30 μm, between 30 and 50 μm, or between 50 and 100 μm.

~~20.~~19. The method of any one of the preceding claims, wherein the first and second directions are substantially perpendicular to each other.

~~21.~~20. The method of any one of the preceding claims, wherein each second mask portion in the one or more second mask portions has characteristic dimensions of between 0.001 x 0.001 and 0.1 x 0.1 mm^2, between 1 x 1 and 1.5 x 1.5 mm^2, between 1.5 x 1.5 and 2x2 mm^2, between 2 x 2 and 2.5 x 2.5 mm^2, or between 2.5 x 2.5 and 3 x 3 mm^2.

~~22.~~21. The method of any one of the preceding claims, wherein the one or more second mask portions comprises between 10 and 50 second mask portions, between 50 and 100 second mask

portions, between 100 and 150 second mask portions, between 150 and 200 second mask portions, between 200 and 300 second mask portions, between 300 and 400 second mask portions, or between 400 and 500 second mask portions, or between 1000 and 100000 second mask portions wherein each second mask portion is spatially separated from another.

~~23.~~22. The method of claim 21~~22~~, wherein at least two second mask portions have a same configuration.

~~24.~~23. The method of any one of claims 21~~22~~ ~~22~~23~~23~~, wherein at least two second mask portions have different configurations.

~~25.~~24. The method of any one of preceding claims, wherein the first relative position in the second plurality of relative positions coincides with the first relative position in the first plurality of relative positions.

~~26.~~25. The method of any one of preceding claims, wherein the positioning (C) is performed stepwise and successively along the first direction.

~~27.~~26. The method of any one of preceding claims, wherein the positioning (E) is performed stepwise and successively along the second direction.

~~28.~~27. The method of any one of the preceding claims, wherein the positioning (E) is performed prior to or subsequent to the positioning (C).

~~29.~~28. The method of any one of the preceding claims, wherein at least two first distances are the same as each other, wherein a first distance is a distance between two adjacent relative positions in the first plurality of relative positions.

~~30.~~29. The method of any one of the preceding claims, wherein at least two first distances are different from each other, wherein a first distance is a distance between two adjacent relative positions in the first plurality of relative positions.

~~31.~~30. The method of any one of the preceding claims, wherein at least two second distances are the same as each other, wherein a second distance is a distance between two adjacent relative positions in the second plurality of relative positions.

~~32.~~31. The method of any one of the preceding claims, wherein at least two second distances are different from each other, wherein a second distance is a distance between two adjacent relative positions in the second plurality of relative positions.

~~33.~~32. The method of any one of the preceding claims, wherein at least two doses in the first plurality of doses are the same as each other.

~~34.~~33. The method of any one of the preceding claims, wherein at least two doses in the first plurality of doses are different from each other.

~~35.~~34. The method of any one of the preceding claims, wherein at least two doses in the second plurality of doses are the same as each other.

~~36.~~35. The method of any one of the preceding claims, wherein at least two doses in the second plurality of doses are different from each other.

~~37.~~36. The method of any one of the preceding claims, wherein the first plurality of relative positions along the first direction comprises between 10 and 200 relative positions, between 200 and 500 relative positions, or between 500 and 1000 relative positions.

~~38.~~37. The method of any one of the preceding claims, wherein the second plurality of relative positions along the first direction comprises between 10 and 200 relative positions, between 200 and 500 relative positions, or between 500 and 1000 relative positions.

~~39. A method for one or more optical arrays, the method comprising:~~

~~(A) providing a master comprising one or more patterned structures, each patterned structure comprising an array of segments at different heights;~~

~~(B) creating a replica comprising a first polymer layer, wherein the first polymer layer comprises one or more replicated structures, each replicated structure corresponding to a patterned structure in the one or more structures of the master, each replicated structure comprising an array of first surfaces at different depths corresponding to the array of segments at different heights;~~

(C) depositing a layer of first reflective material on the first surfaces of each replicated structure in the one or more replicated structures, thereby producing a first reflective layer on the first surfaces of each replicated structure in the one or more replicated structures;

(D) casting, subsequent to the depositing (C), a second polymer layer to the one or more replicated structures, wherein the second polymer layer comprises a planar polymer surface over each replicated structure in the one or more replicated structures; and

(E) depositing, subsequent to the casting (D), a layer of second reflective material on the planar polymer surface over each replicated structure in the one or more replicated structures, thereby producing a second reflective layer on the planar polymer surface over each replicated structure in the one or more replicated structures;

wherein corresponding to each replicated structure in the one or more replicated structures, an optical array is formed by the first reflective layer, the second reflective layer and the second polymer layer in-between.

40. The method of claim 39, further comprising:

planarizing, subsequent to the casting (D) and prior to the depositing (E), the second polymer layer casted to the one or more replicated structures, thereby producing the planar polymer surface over each replicated structure in the one or more replicated structures.

41. The method of claim 40, wherein the planarizing is performed by chemical polishing, mechanical polishing, plasma etching, or any combination thereof.

42. The method of any one of claims 39-41, further comprising:

attaching a sensor array to the second reflective layer of each optical array, wherein the sensor array is configured to detect light transmitted through the optical array.

43. The method of claim 42, wherein the sensor array is glued to the second reflective layer by an adhesive.

44. The method of any one of claims 42-43, wherein the sensor array comprises a photon detector, a thermal detector, or any combination thereof.

45. The method of claim 44, wherein the photon detector comprises a charge-coupled device (CCD), a complementary metal-oxide semiconductor (CMOS), an Indium Gallium Arsenide

(InGaAs) photodiode detector, a Germanium (Ge) photodiode detector, a Mercury Cadmium Telluride (MCT) array, or any combination thereof.

46. The method of claim 44, wherein the thermal detector comprises a microbolometer array, a microthermocouple array, or any combination thereof.

47. A method, comprising:

(A) providing a master comprising one or more patterned structures, each patterned structure comprising an array of segments at different heights;

(B) creating a replica comprising a first polymer layer, wherein the first polymer layer comprises one or more replicated structures, each replicated structure corresponding to a patterned structure in the one or more structures of the master, each replicated structure comprising an array of first surfaces at different depths corresponding to the array of segments at different heights;

(C) depositing a layer of first reflective material on the first surfaces of each replicated structure in the one or more replicated structures, thereby producing a first reflective layer on the first surfaces of each replicated structure in the one or more replicated structures; and

(D) overlaying the first polymer layer on a substrate comprising a layer of second reflective material;

wherein corresponding to each replicated structure in the one or more replicated structures, an optical array is formed by the first reflective layer, a second reflective layer formed by the layer of second reflective material, and the first polymer layer in-between.

48. The method of claim 47, wherein the overlaying (D) is performed prior or subsequent to the depositing (C).

49. The method of any one of claims 47-48, wherein the substrate comprises a glass substrate, wherein the glass substrate is coated with the layer of second reflective material.

50. The method of any one of claims 47-49, wherein the first polymer layer is glued to the layer of second reflective material.

51. The method of any one of claims 47-50, further comprising:

removing, prior to the overlaying (D), a residual layer from the first polymer layer under each replicated structure in the one or more replicated structures,

52. The method of claim 51, wherein the removing (E) is performed by reactive-ion etching.

53. The method of any one of claims 47-52, further comprising:

attaching a sensor array to the substrate under each optical array, wherein the sensor array is configured to detect light transmitted through the optical array.

54. The method of claim 53, wherein the sensor array is glued to the substrate by an adhesive.

55. The method of any one of claims 53-54, wherein the sensor array comprises a charge-coupled device (CCD), a complementary metal-oxide semiconductor (CMOS), an Indium Gallium Arsenide (InGaAs) photodiode detector, a Germanium (Ge) photodiode detector, a Mercury Cadmium Telluride (MCT) array, a microbolometer array, a microthermocouple array, or any combination thereof.

56. The method of any one of claims 39-55, further comprising:

manufacturing a polymer mold, wherein the polymer mold comprises one or more patterned mold structures in a third polymer layer, wherein each patterned mold structure comprises an array of mold surfaces at different depths;

depositing a conductive film over the one or more patterned molded structures in the third polymer layer; and

electroplating the conductive film over the one or more patterned mold structures in the third polymer layer with a layer of an electroplating material, thereby producing the master made of the electroplating material.

57. The method of claim 56, wherein the electroplating material comprises nickel.

58. The method of any one of claims 39-56, wherein the first or second reflective material comprises aluminum.

59. The method of any one of claims 39-58, wherein of a respective replicated structure in the one or more replicated structures, the depths of the array of first surfaces range from 0 to 2

~~μm, from 0 to 5 μm, from 0 to 10 μm, from 0 to 15 μm, from 0 to 20 μm, from 0 to 25 μm, from 0 to 30 μm, from 0 to 50 μm, or from 0 to 100 μm~~

~~60. The method of claim 59, wherein of a respective replicated structure in the one or more replicated structures, at least two depths of the array of first surfaces differ from each other by at least two orders of magnitude, or by at least three orders of magnitude.~~

~~61. The method of any one of claims 39-60, wherein of a respective replicated structure in the one or more replicated structures, the array of first surfaces comprises N x M first surfaces, wherein M is any integer between 1 and 5000, and N is any integer between 1 and 5000.~~

~~62. A method for manufacturing one or more filter arrays each with replicated units, the method comprising:~~
~~(A) providing a substrate comprising a first polymer layer sensitive to a radiation;~~
~~(B) providing a single mask comprising a first mask portion and one or more second mask portion arrays, wherein the first mask portion is configured to block the radiation, and each second mask portion array in the one or more second mask portion arrays comprises an array of second mask portions configured to allow the radiation to pass through, wherein each second mask portion in the array of second mask portions has a first dimension in a first direction and a second dimension in a second direction, wherein the second direction is different from the first direction;~~
~~(C) positioning the substrate and the mask relative to each other at each relative position in an array of relative positions, wherein a distance between two adjacent relative positions along the first direction is equal to in the first dimension of any second mask portion in the array of second mask portions, and a distance between two adjacent relative positions along the second direction is equal to the second dimension of any second mask portion in the array of second mask portions; and~~
~~(D) exposing, at each respective relative position in the array of relative positions, the first polymer layer through the mask to a corresponding dose in an array of doses of the radiation, thereby producing one or more exposed polymer portions in the first polymer layer, wherein each exposed polymer portion comprises an array of dosed units and each dosed unit comprises~~

an array of dosed segments, wherein of each dosed unit, at least two dosed segments are exposed to different doses of the radiation.

63. The method of claim 62, wherein the positioning (C) is performed stepwise.

64. The method of any one of claims 62-63, further comprising:
(E) developing the first polymer layer of the substrate such that each exposed polymer portion produces a patterned structure, thereby creating one or more patterned structures in the first polymer layer of the substrate, wherein each patterned structure comprises an array of structure units, each structure unit comprising an array of first surfaces, wherein of each structure unit of each patterned structure, at least two first surfaces are at different depths.

65. The method of claim 64, wherein of each dosed unit of each exposed polymer portion, each dosed segment is exposed to a different dose of the radiation, thereby producing each first surface of each structure unit of each patterned structure at a different depth.

66. The method of any one of claims 64-65, wherein of a respective structure unit, the depths of the array of first surfaces range from 100 nm to 300 nm, from 200 nm to 400 nm, from 300 nm to 500 nm, from 400 nm to 800 nm, from 500 nm to 1000 nm, from 200 nm to 1000 nm, from 200 nm to 1500 nm, from 100 nm to 1500 nm, or from 100 nm to 2000 nm..

67. The method of any one of claims 64-66, further comprising:
(F) depositing a layer of a first reflective material on top of the one or more patterned structures.

68. The method of claim 67, further comprising:
(G) overlaying a first protection layer on the layer of the first reflective material.

69. The method of claim 68, further comprising:
(H) overlaying a second protection layer on the first protection layer.

70. The method of any one of claims 67-69, further comprising:
(I) dicing the substrate to produce one or more individual chips, each comprising a patterned structure in the one or more patterned structures.

71. The method of any one of claims 67-70, wherein the substrate comprises a glass substrate coated with a layer of second reflective material, wherein the first polymer layer overlays the layer of second reflective material, wherein corresponding to each of the one or more patterned structures, an optical array is formed by the second reflective layer, a first reflective layer formed by the layer of first reflective material, and the first polymer layer in-between.

72. The method of claim 71, further comprising:
(J) attaching a sensor array to the layer of the second reflective material above each of the one or more patterned structures or to the substrate under each of the one or more patterned structures, wherein the sensor array is configured to detect light transmitted through the optical array, wherein the attaching is performed prior to or subsequent to the dicing (I).

73. The method of any one of claims 62-72, wherein the one or more second mask portion arrays comprises a number of second mask portion arrays that is between 10 and 50, between 50 and 100, between 100 and 150, between 150 and 200, between 200 and 300, between 300 and 400, or between 400 and 500, wherein each second mask portion array is spatially separated from another.

74. The method of any one of claims 62-73, wherein a second mask portion array in the one or more second mask portion arrays comprises a number of second mask portions that is between 10 and 100, between 100 and 200, between 200 and 500, between 500 and 1000, between 1000 and 2000, between 2000 and 5000, or between 5000 and 10000, wherein each second mask portion is spatially separated from another.

75. The method of any of claims 62-74, wherein the array of relative positions is a 1-dimensional or 2-dimensional array, and comprises a number of relative positions that is between 3 and 10, between 10 and 20, between 20 and 50, between 50 and 100, or between 100 and 1000.

76. The method of any one of claims 62-75, wherein each second mask portion has characteristic dimensions of between 0.1 x 0.1 μm^2 and 1 x 1 μm^2, between 1 x 1 μm^2 and 10 x 10 μm^2, between 10 x 10 μm^2 and 20 x 20 μm^2, or between 20 x 20 μm^2 and 30 x 30 μm^2.

77. A method for mass replicating one or more filter arrays each with replicated units, the method comprising:

(A) providing a master comprising one or more patterned structures, each patterned structure comprising an array of structure unit, each structure unit comprising an array of segments, wherein of each structure unit, at least two segments in the array of segments are at different heights;

(B) creating a replica comprising a first polymer layer, wherein the first polymer layer comprises one or more replicated structures, each replicated structure corresponding to a patterned structure in the one or more structures of the master, each replicated structure comprising an array of replicated structure units, each replicated structure unit comprising an array of first surfaces, wherein of each replicated structure unit, at least two first surfaces in the array of first surfaces are at different depths;

(C) depositing a layer of first reflective material on the first surfaces of each replicated structure in the one or more replicated structures, thereby producing a first reflective layer on the first surfaces of each replicated structure unit of each replicated structure in the one or more replicated structures;

(D) casting, subsequent to the depositing (C), a second polymer layer to the one or more replicated structures, wherein the second polymer layer comprises a planar polymer surface over each replicated structure in the one or more replicated structures; and

(E) depositing, subsequent to the casting (D), a layer of second reflective material on the planar polymer surface over each replicated structure in the one or more replicated structures, thereby producing a second reflective layer on the planar polymer surface over each replicated structure in the one or more replicated structures;

wherein corresponding to each replicated structure in the one or more replicated structures, an optical array is formed by the first reflective layer, the second reflective layer and the second polymer layer in-between.

78. The method of claim 77, further comprising:

planarizing, subsequent to the casting (D) and prior to the depositing (E), the second polymer layer casted to the one or more replicated structures, thereby producing the planar polymer surface over each replicated structure in the one or more replicated structures.

79. The method of any one of claims 77-78, further comprising:

attaching a sensor array to the second reflective layer of each optical array, wherein the sensor array is configured to detect light transmitted through the optical array.

80. A method for mass replicating one or more filter arrays each with replicated units, the method comprising:

(A) providing a master comprising one or more patterned structures, each patterned structure comprising an array of structure unit, each structure unit comprising an array of segments, wherein of each structure unit, at least two segments in the array of segments are at different heights;

(B) creating a replica comprising a first polymer layer, wherein the first polymer layer comprises one or more replicated structures, each replicated structure corresponding to a patterned structure in the one or more structures of the master, each replicated structure comprising an array of replicated structure units, each replicated structure unit comprising an array of first surfaces, wherein of each replicated structure unit, at least two first surfaces in the array of first surfaces are at different depths;

(C) depositing a layer of first reflective material on the first surfaces of each replicated structure in the one or more replicated structures, thereby producing a first reflective layer on the first surfaces of each replicated structure unit of each replicated structure in the one or more replicated structures; and

(D) overlaying the first polymer layer on a substrate comprising a layer of second reflective material;

wherein corresponding to each replicated structure in the one or more replicated structures, an optical array is formed by the first reflective layer, a second reflective layer formed by the layer of second reflective material, and the first polymer layer in-between.

81. The method of claim 80, wherein the overlaying (D) is performed prior or subsequent to the depositing (C).

82. The method of any one of claims 80-81, further comprising:

removing, prior to the overlaying (D), a residual layer from the first polymer layer under each replicated structure in the one or more replicated structures.

83. The method of any one of claims 80-82, further comprising:

attaching a sensor array to the substrate under each optical array, wherein the sensor array is configured to detect light transmitted through the optical array.

84. The method of any one of claims 77-83, further comprising:
manufacturing a polymer mold, wherein the polymer mold comprises one or more patterned mold structures in a third polymer layer, wherein each patterned mold structure comprises an array of mold structure unit, each mold structure unit comprising an array of mold surfaces at different depths;
depositing a conductive film over the one or more patterned molded structures in the third polymer layer; and
electroplating the conductive film over the one or more patterned mold structures in the third polymer layer with a layer of an electroplating material, thereby producing the master made of the electroplating material.

85. An optical array comprising:
at least 1000 etalons, each having a different depth and configured to generate a different transmission pattern when impinged by a light, such that the optical array enables recovery of both narrow and wide spectral bands at high spectral resolutions.

86. The optical array of claim 85, wherein the multiple modes comprise a Fabry–Pérot interferometer mode and a reconstructive spectroscopy mode.

87. The optical array of any one of claims 85-85, wherein the narrow and wide spectral bands are within a spectrum ranging from 200 to 2500 nm.

88. The optical array of claims 85-87, wherein the depths of at least two etalons in the optical array differ from each other by at least two orders of magnitude, or by at least three orders of magnitude.

89. The optical array of any one of claims 85-88, wherein the depths of the array of etalons range from 0 to 2 μm, from 0 to 5 μm, from 0 to 10 μm, from 0 to 15 μm, from 0 to 20 μm, from 0 to 25 μm, , from 0 to 30 μm, from 0 to 50 μm, or from 0 to 100 μm.

~~90. The optical array of any one of claims 85-89, wherein the at least 1000 etalons are arranged as an N x M array, wherein M is any integer between 1 and 5000, and N is any integer between 1 and 5000.~~

~~91. An optical array comprising:~~

~~an array of etalons, each etalon having a different depth and configured to generate a different transmission pattern when impinged by a light, wherein the depths of at least two etalons in the array differ from each other by two to three orders of magnitude, such that the optical array enables recovery of both narrow and wide spectral bands at high spectral resolutions.~~

~~92. The optical array of claim 91, wherein the multiple modes comprise a Fabry–Pérot interferometer mode and a reconstructive spectroscopy mode, and the spectrum of light ranges from 200 to 25000 nm.~~

~~93.~~38. An optical array made by the method of any one of claims 1-37~~84~~.

~~94.~~39. A system, comprising:

at least one processor and memory addressable by the at least one processor, the memory storing at least one program for execution by the at least one processor, the at least one program comprising instructions for performing the method of any one of claims 1-37~~84~~.