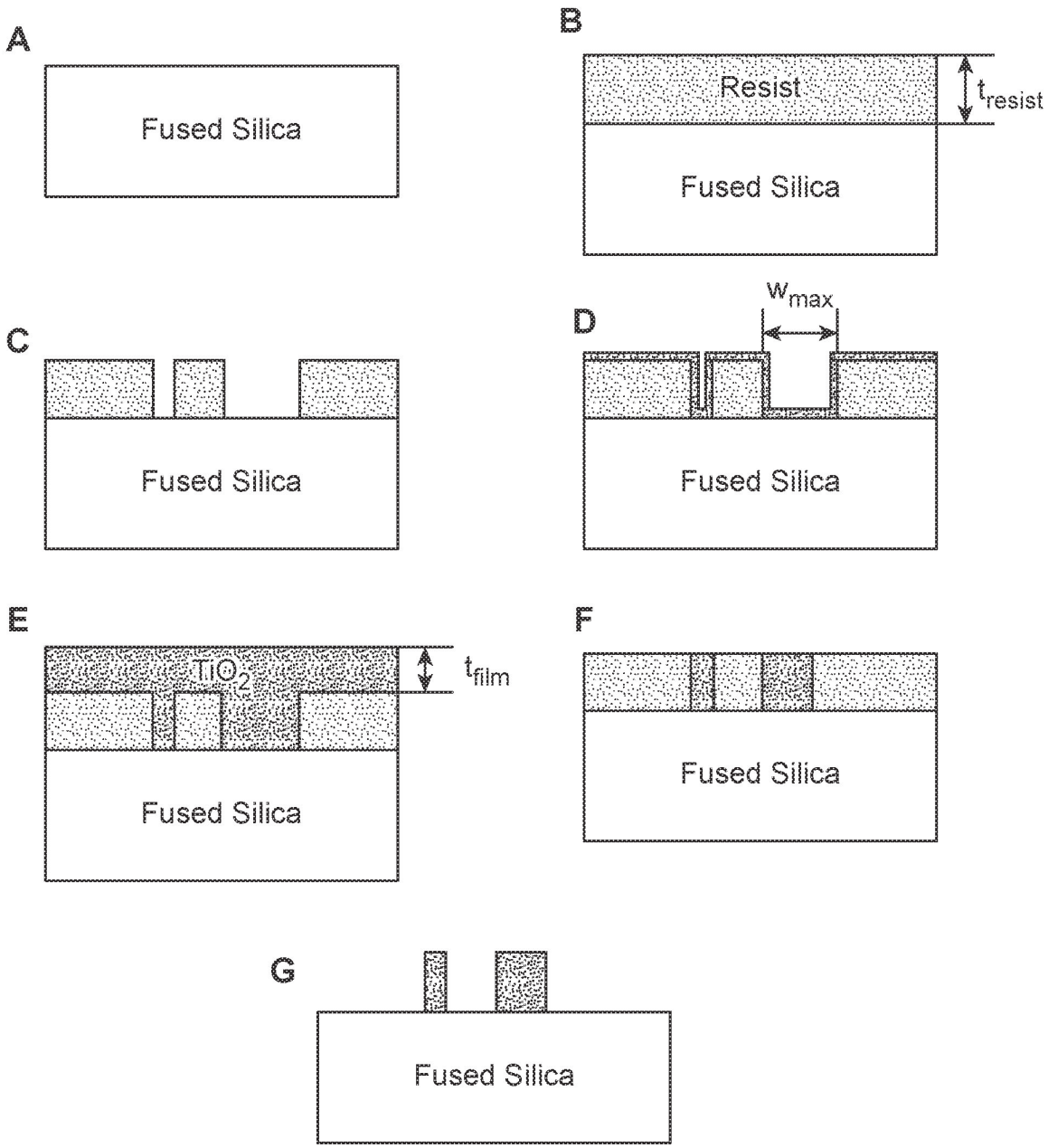

A
Fused Silica
B
Resist
t_{resist}
Fused Silica
C
Fused Silica
D
w_{max}
Fused Silica
E
TiO_2
t_{film}
Fused Silica
F
Fused Silica
G
Fused Silica

FIG. 1

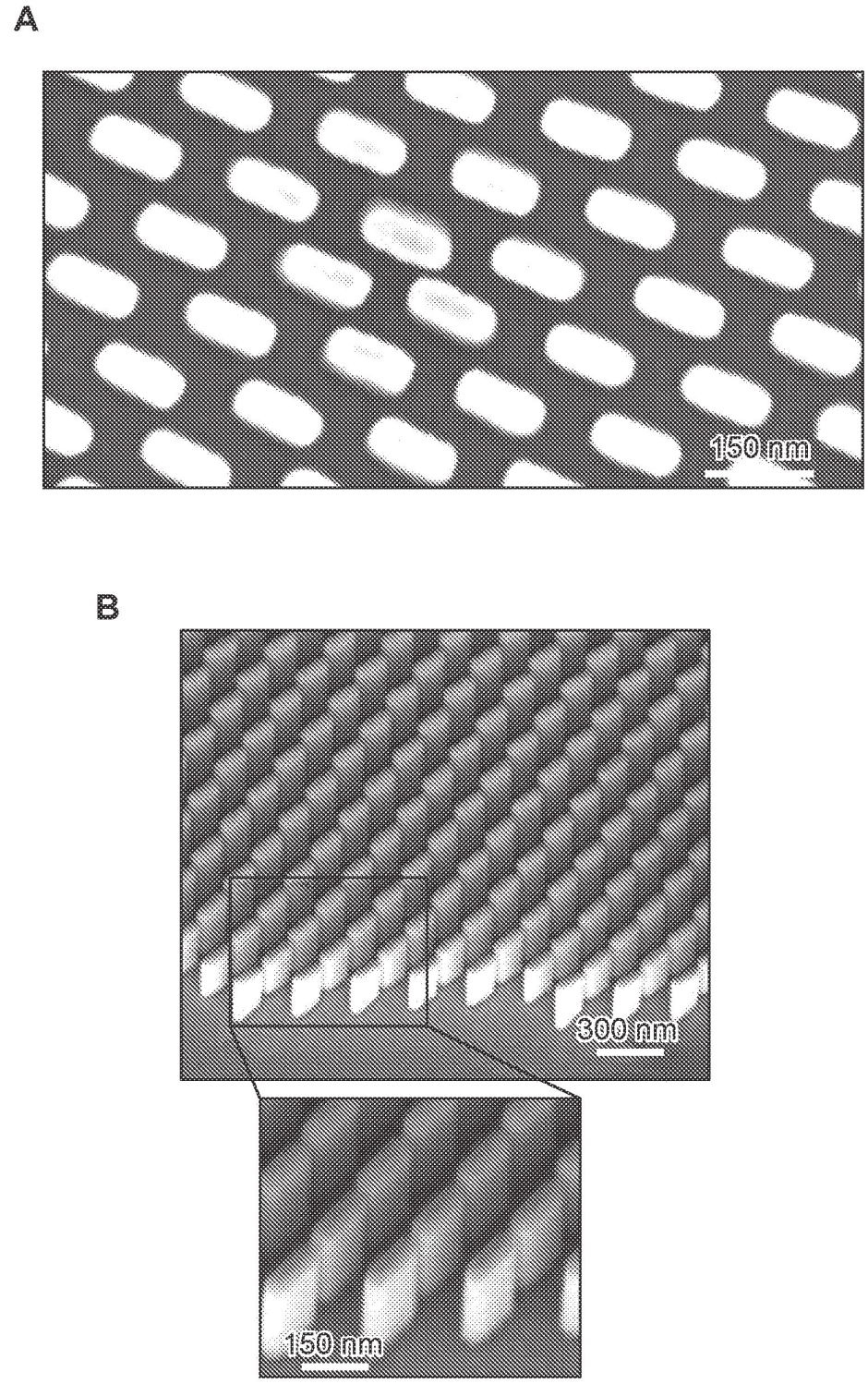
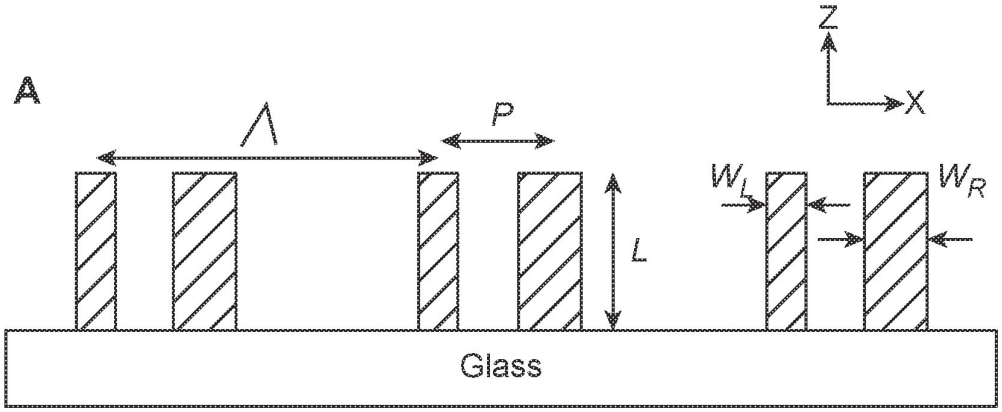


FIG. 2


A
Z
X
Λ
P
L
W_L
W_R
Glass

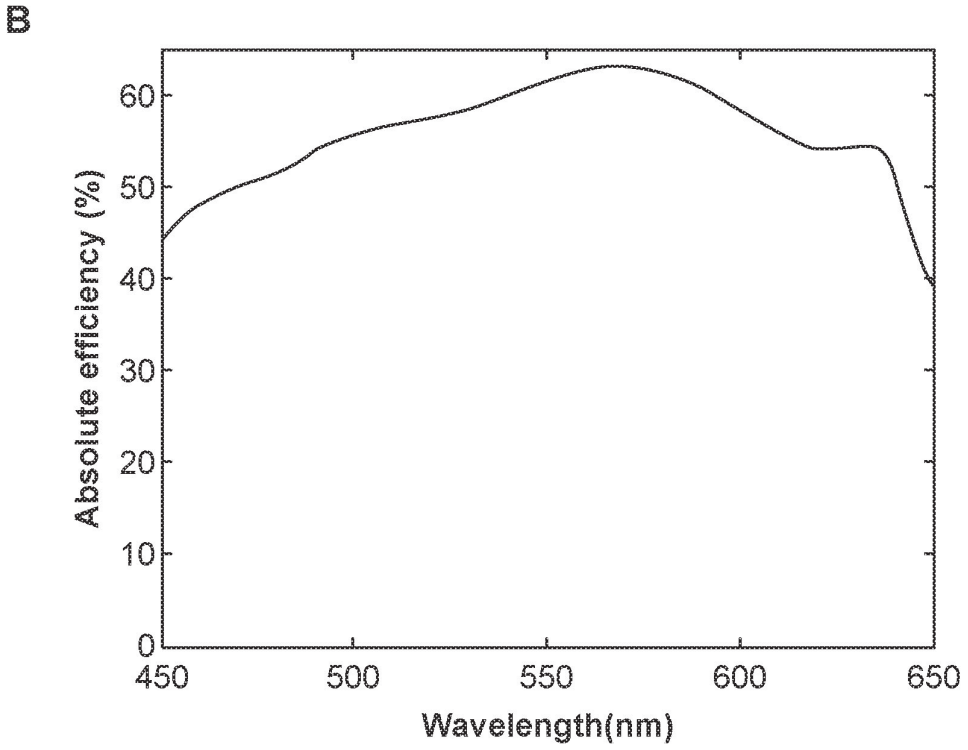

B
Absolute efficiency (%)
0
10
20
30
40
50
60
450
500
550
600
650
Wavelength(nm)

FIG. 3

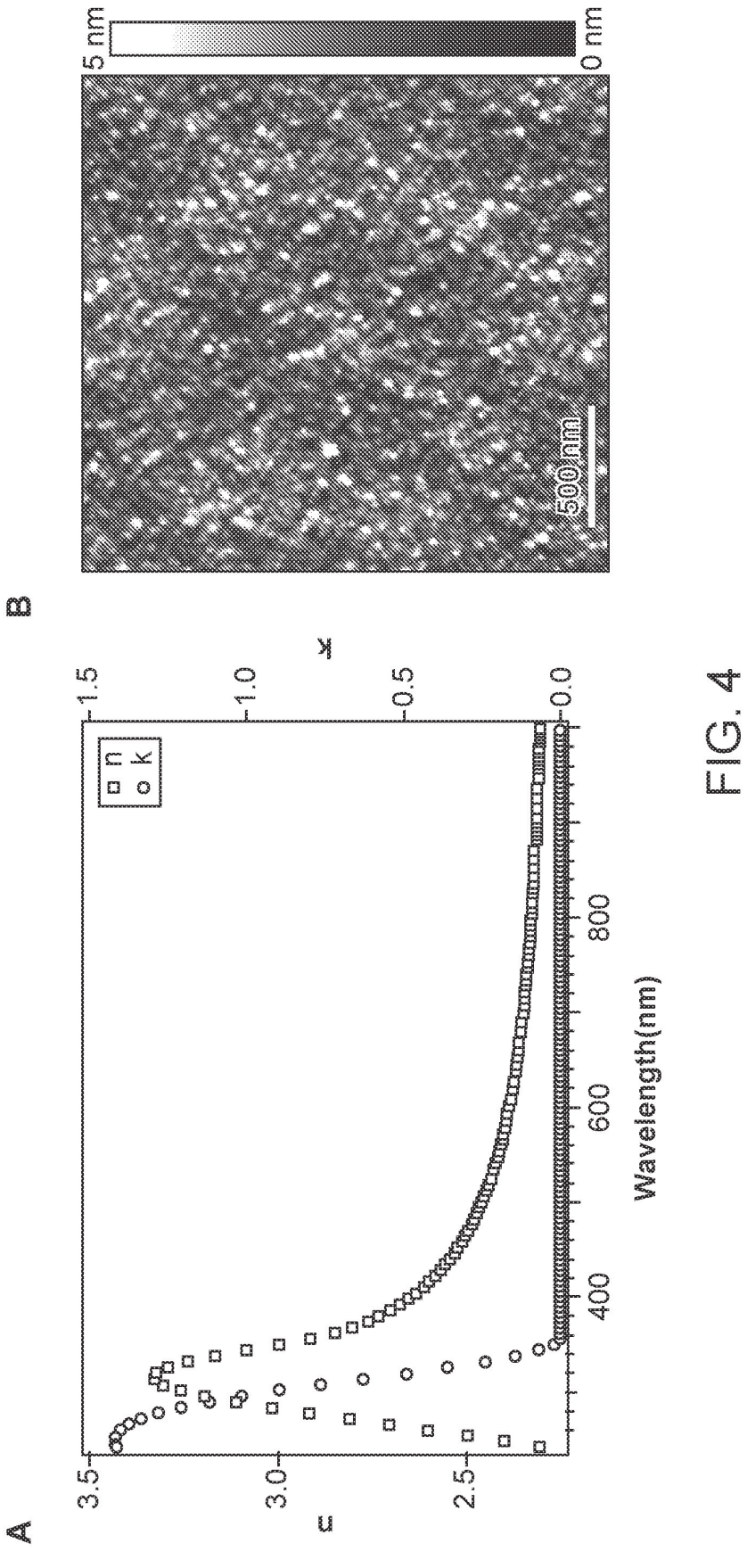

A
B
5 nm
0 nm
500 nm
n
k
3.5
3.0
2.5
1.5
1.0
0.5
0.0
400
600
800
Wavelength(nm)

FIG. 4

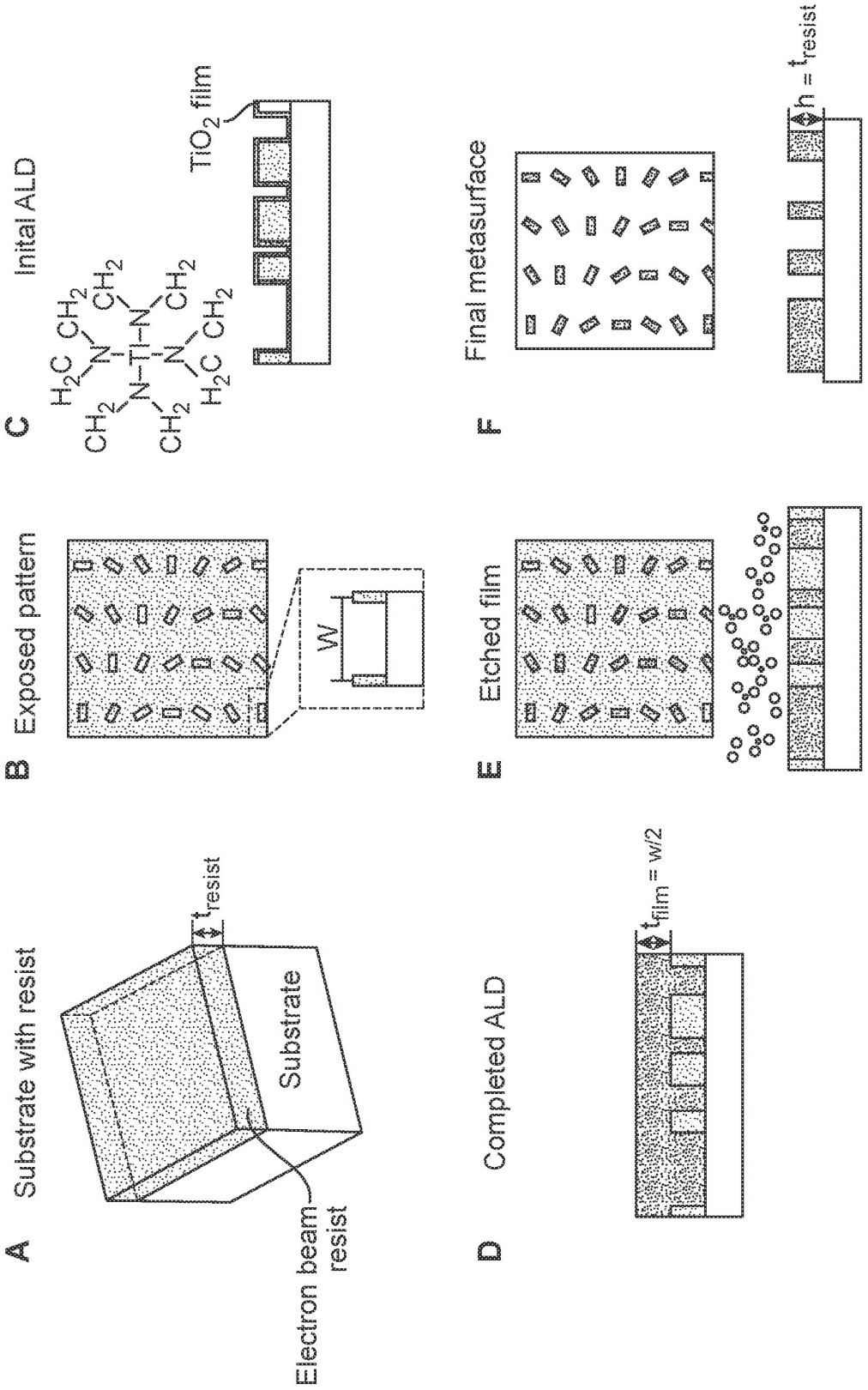

A
Substrate with resist
t_{resist}
Substrate
Electron beam resist
B
Exposed pattern
W
C
Inital ALD
TiO_2 film
H_2C CH_2
CH_2 CH_2
N
Ti
D
Completed ALD
$t_{film} = w/2$
E
Etched film
F
Final metasurface
$h = t_{resist}$

FIG. 5

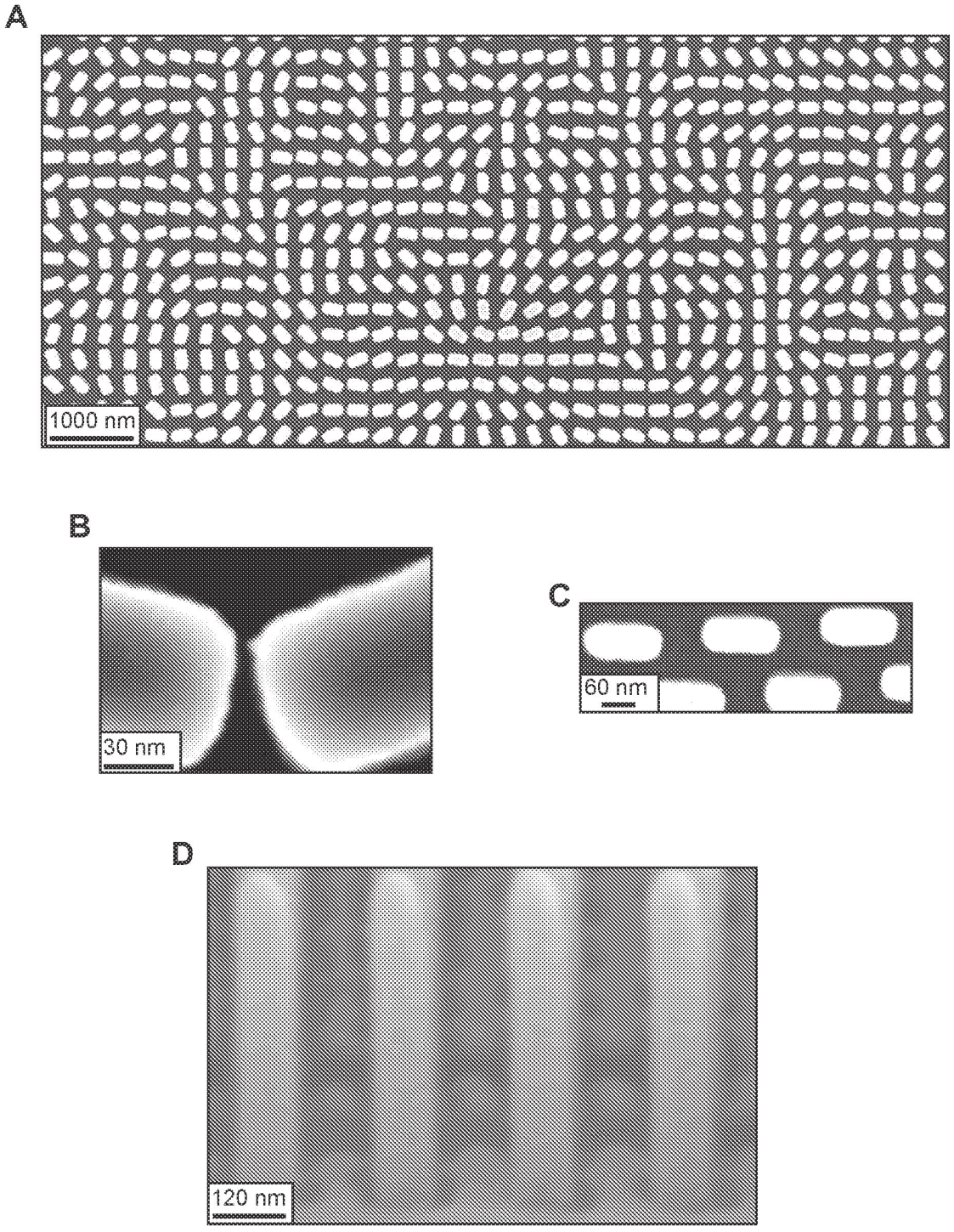


FIG. 6

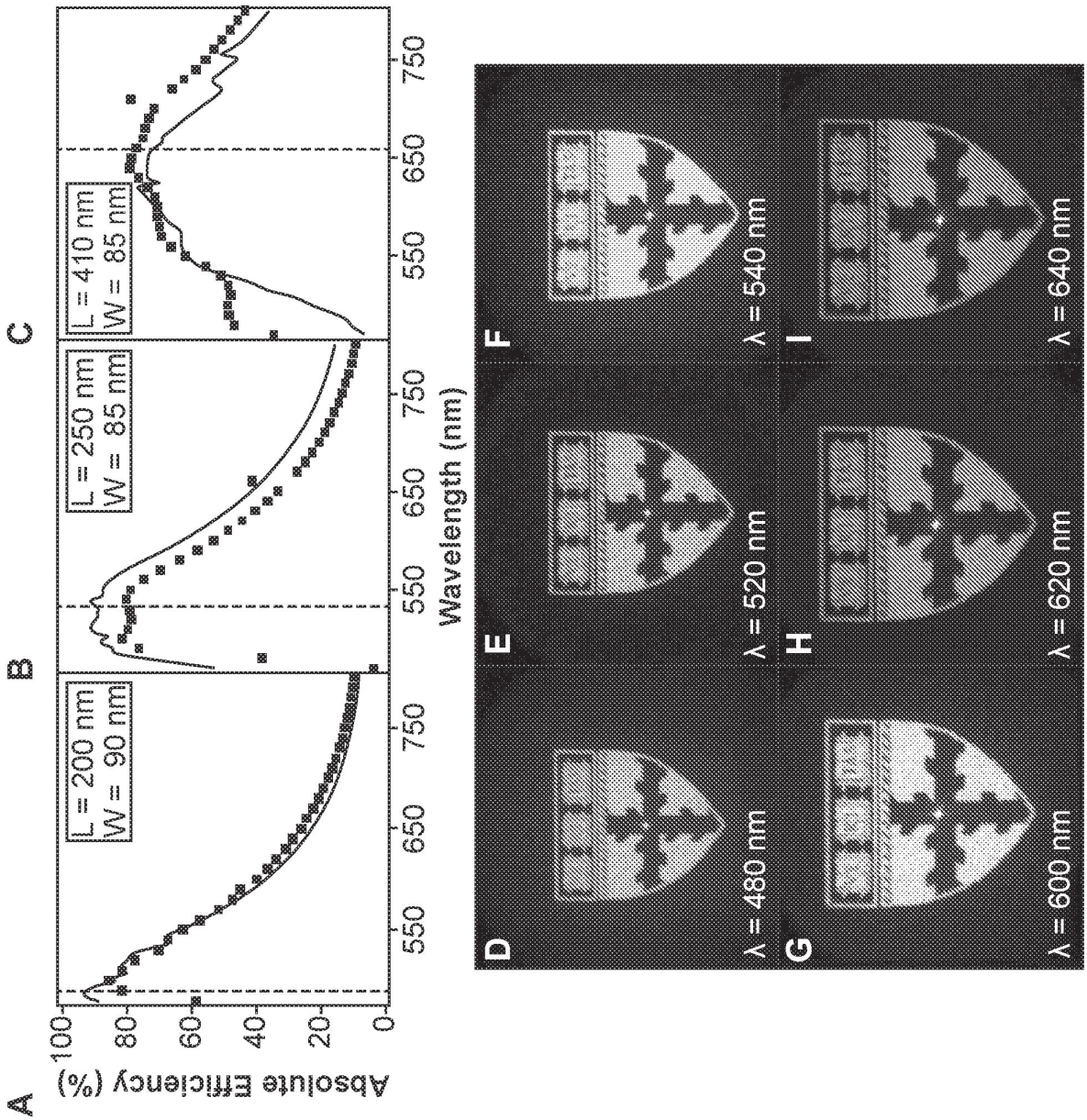

A
B
C
Absolute Efficiency (%)
100
80
60
40
20
0
L = 200 nm
W = 90 nm
L = 250 nm
W = 85 nm
L = 410 nm
W = 85 nm
550
650
750
Wavelength (nm)
D
E
F
λ = 480 nm
λ = 520 nm
λ = 540 nm
G
H
I
λ = 600 nm
λ = 620 nm
λ = 640 nm

FIG. 7

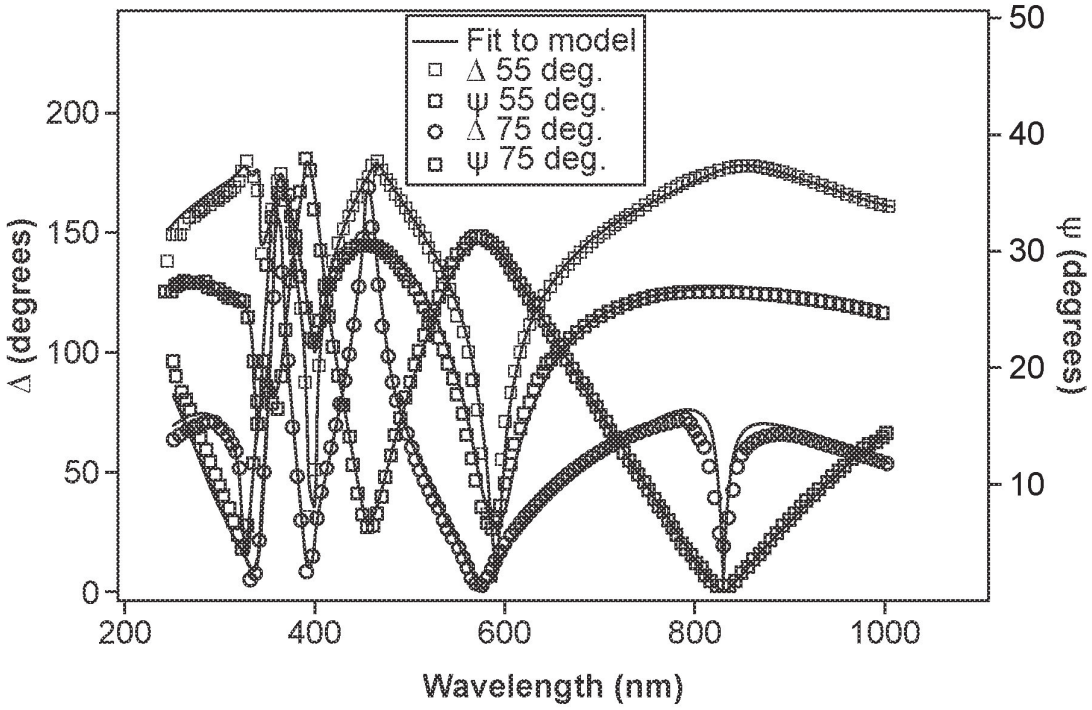

Fit to model
Δ 55 deg.
ψ 55 deg.
Δ 75 deg.
ψ 75 deg.
Δ (degrees)
ψ (degrees)
Wavelength (nm)
0
50
100
150
200
10
20
30
40
50
200
400
600
800
1000

FIG. 8

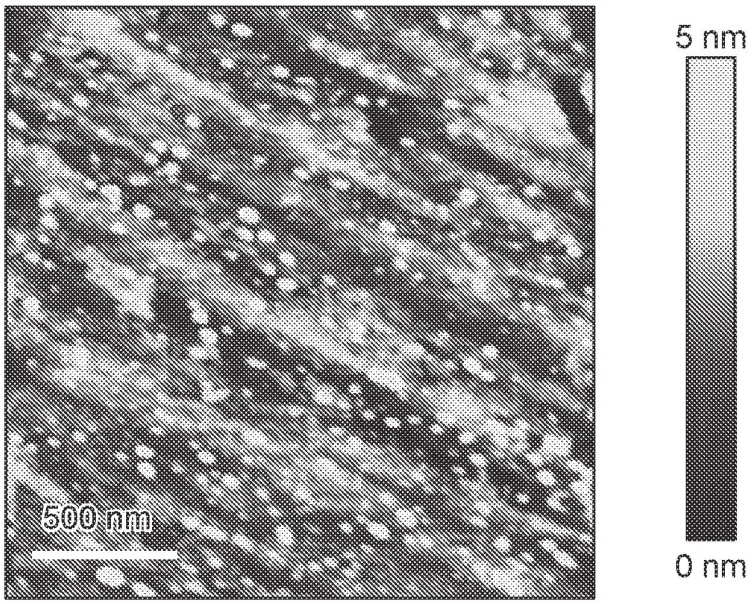

500 nm
5 nm
0 nm

FIG. 9

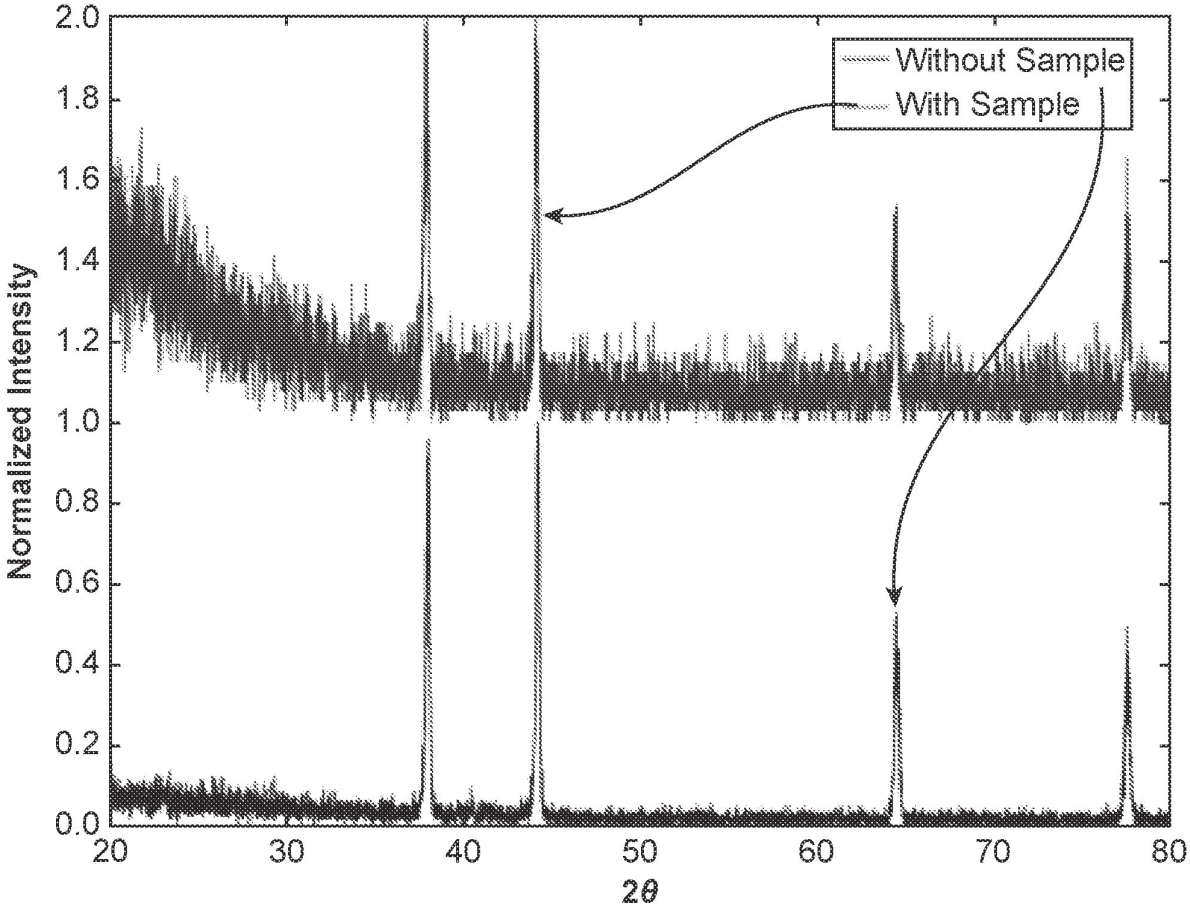

Without Sample
With Sample
Normalized Intensity
2θ
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
20
30
40
50
60
70
80

FIG. 10

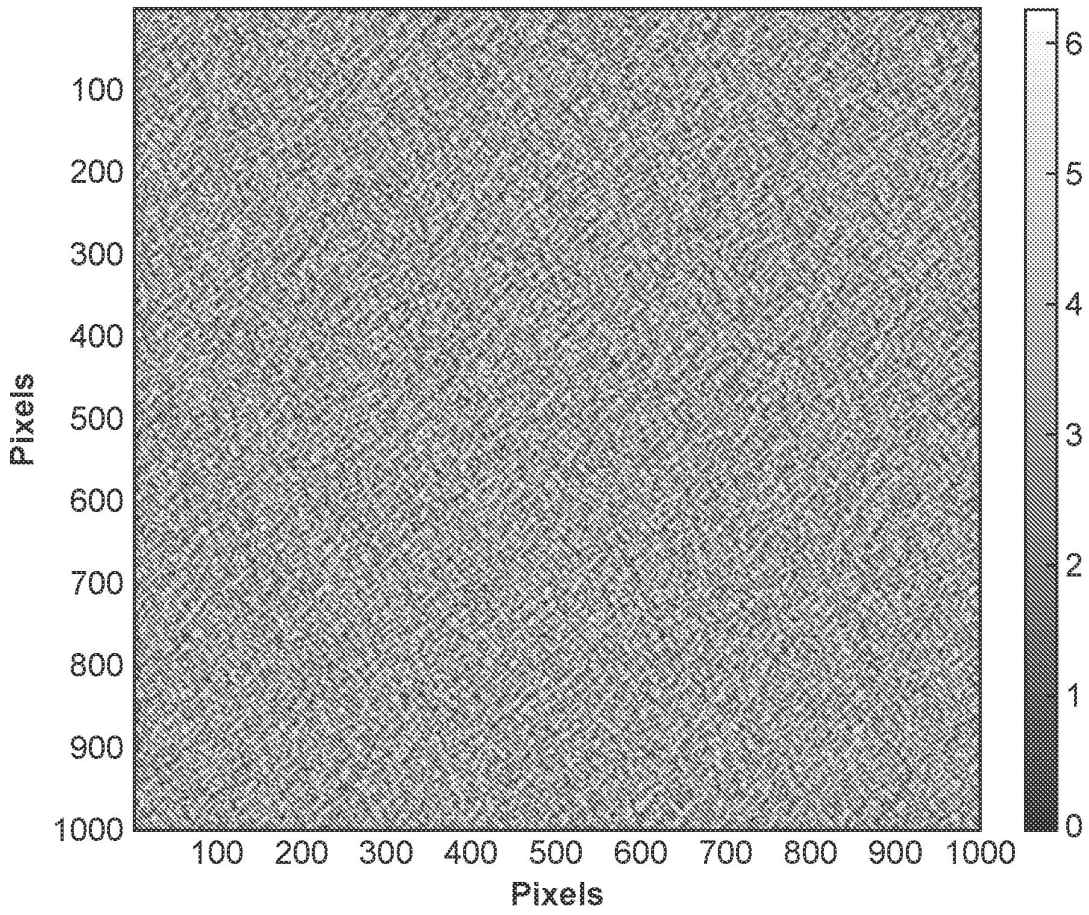

100
200
300
400
500
600
700
800
900
1000
Pixels
100 200 300 400 500 600 700 800 900 1000
Pixels
6
5
4
3
2
1
0

FIG. 11

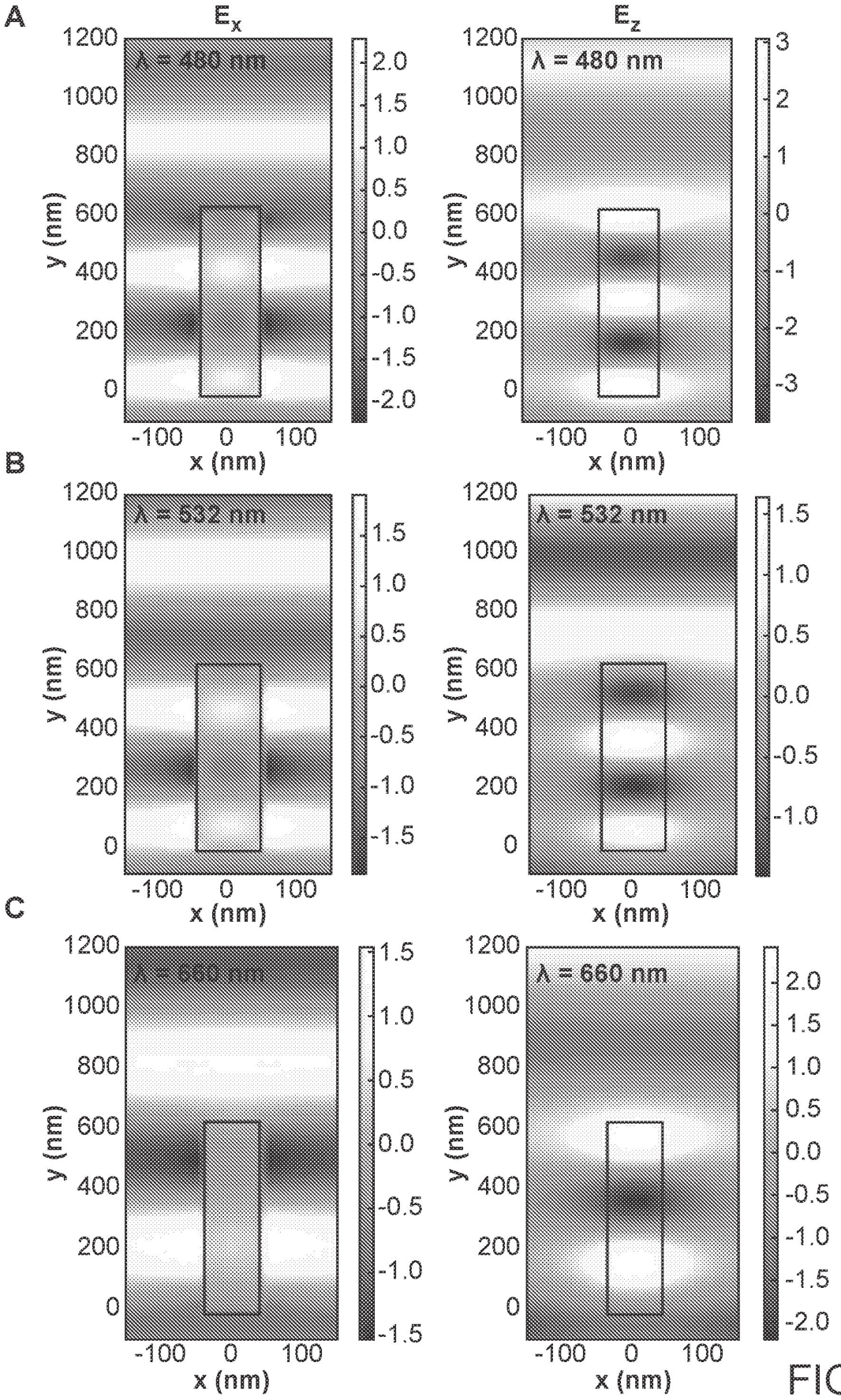


FIG. 12

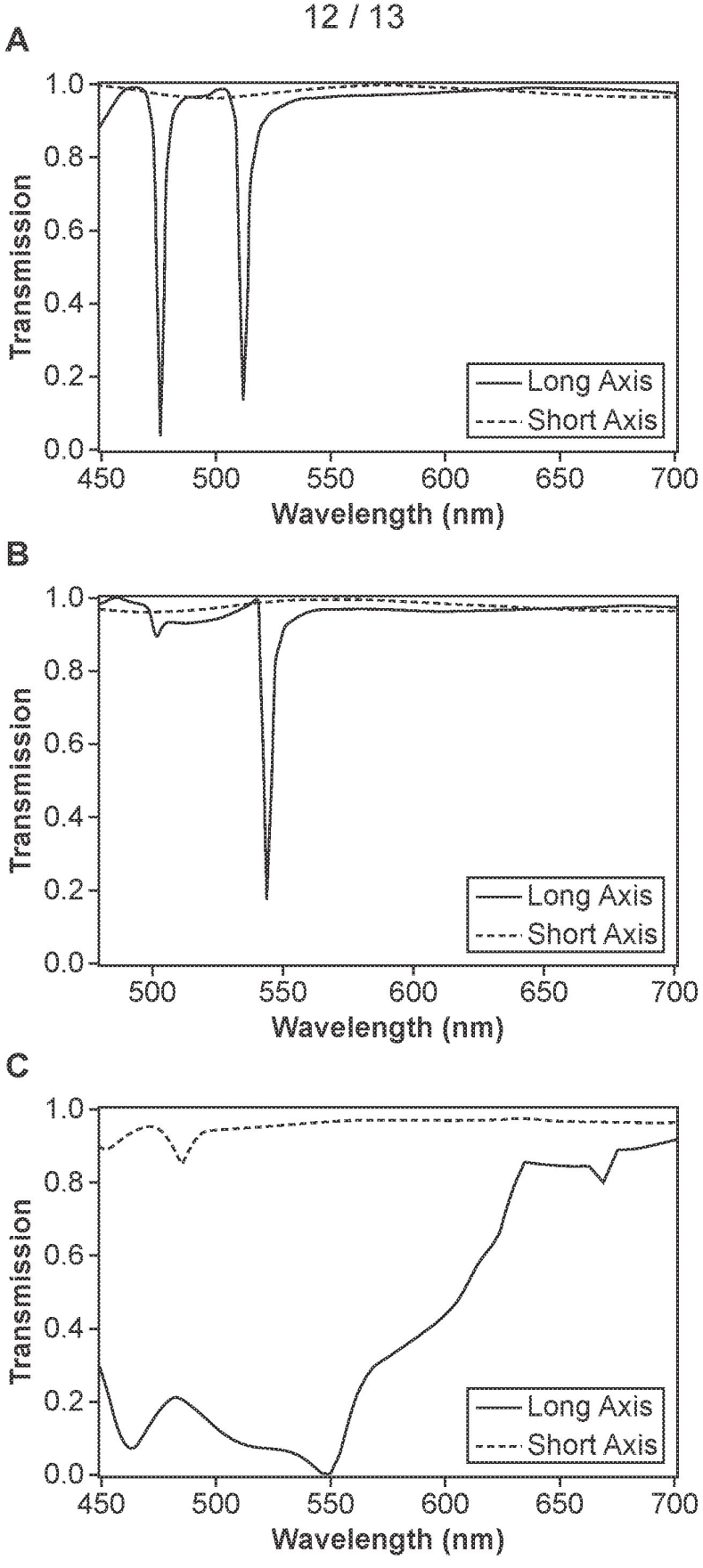

A
1.0
0.8
0.6
0.4
0.2
0.0
Transmission
Long Axis
Short Axis
450
500
550
600
650
700
Wavelength (nm)
B
1.0
0.8
0.6
0.4
0.2
0.0
Transmission
Long Axis
Short Axis
500
550
600
650
700
Wavelength (nm)
C
1.0
0.8
0.6
0.4
0.2
0.0
Transmission
Long Axis
Short Axis
450
500
550
600
650
700
Wavelength (nm)

FIG. 13

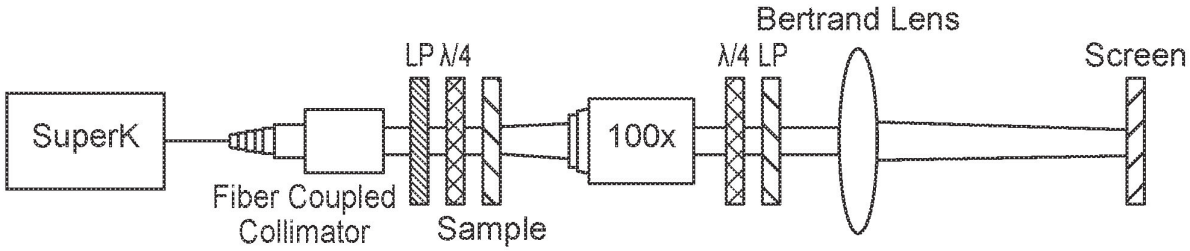

Bertrand Lens
LP λ/4
λ/4 LP
Screen
SuperK
100x
Fiber Coupled
Collimator
Sample
λ/4=Quarter waveplate
LP:Liner polarizer

FIG. 14

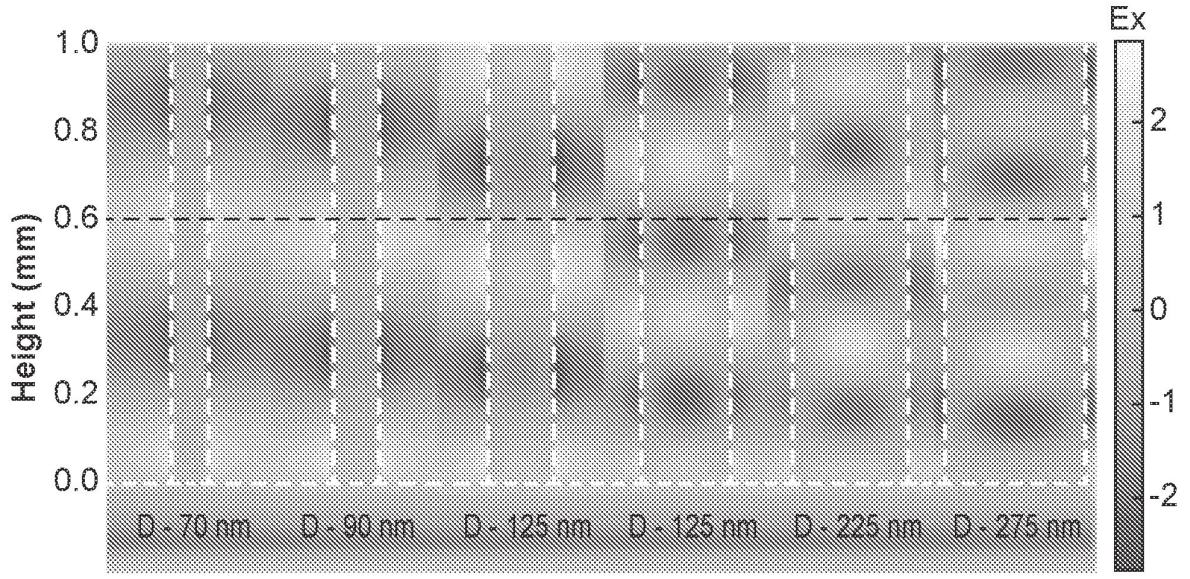

Ex
1.0
0.8
0.6
0.4
0.2
0.0
Height (mm)
2
1
0
-1
-2
D - 70 nm
D - 90 nm
D - 125 nm
D - 125 nm
D - 225 nm
D - 275 nm

FIG. 15