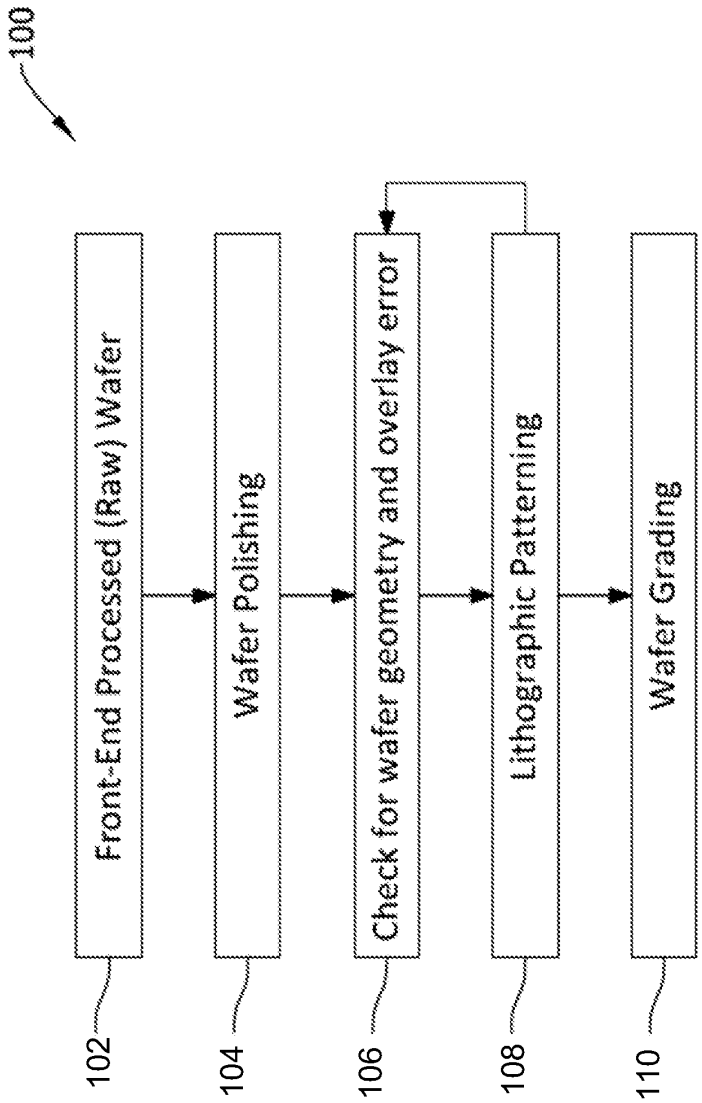

FIG. 1
Prior Art


200
Front-End Processed (Raw) Wafer
Front-End Wafer Grading
Out of spec
204
Wafer Polishing
Check for wafer geometry and overlay error
Lithographic Patterning
Wafer Grading
102
202
104
106
108
110

FIG. 2

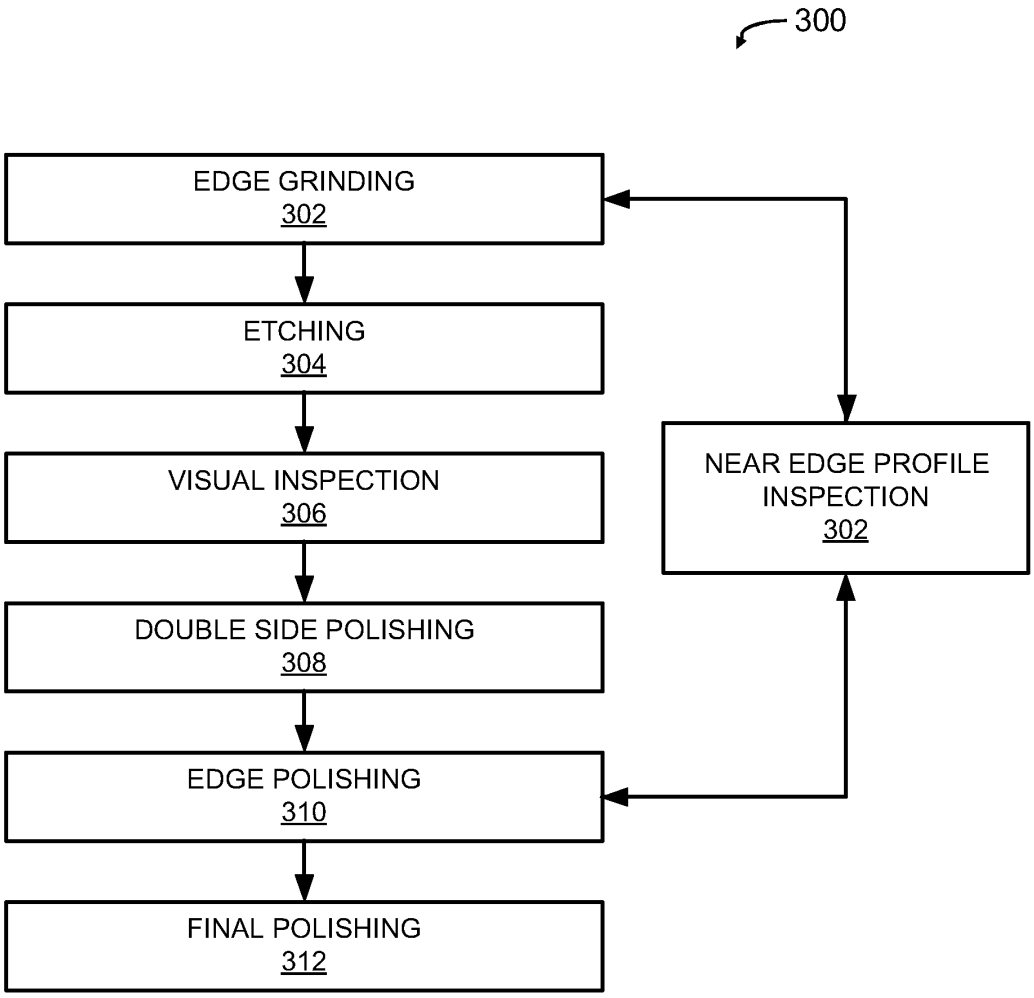
300
EDGE GRINDING
302
ETCHING
304
VISUAL INSPECTION
306
DOUBLE SIDE POLISHING
308
EDGE POLISHING
310
FINAL POLISHING
312
NEAR EDGE PROFILE
INSPECTION
302

FIG. 3

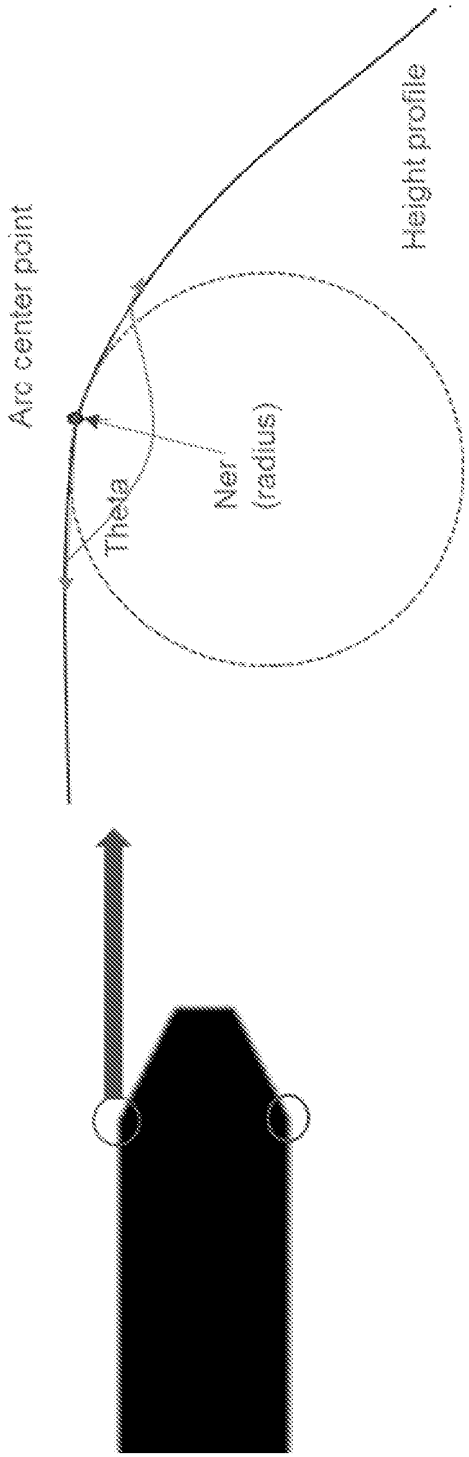

FIG. 4

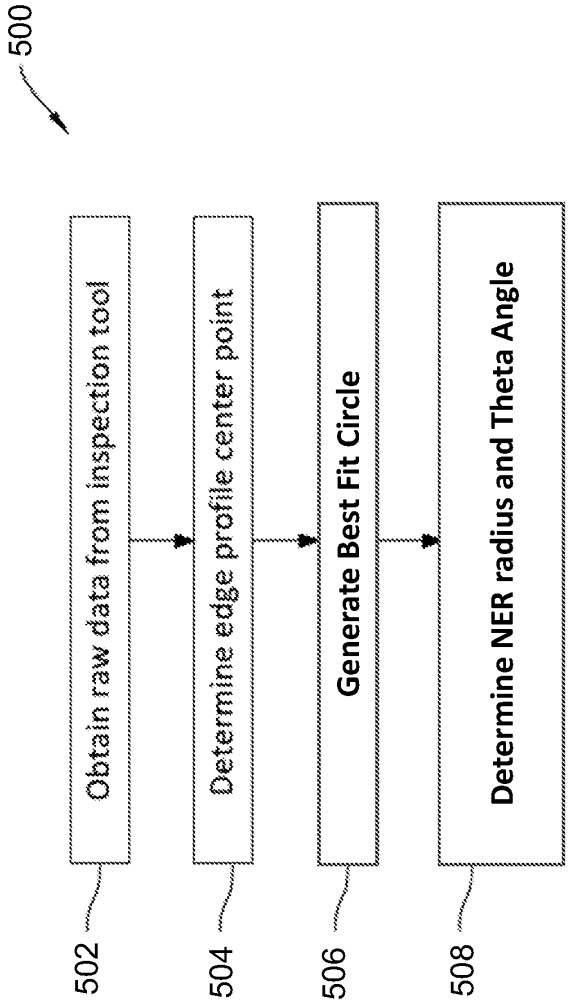
500
Obtain raw data from inspection tool
Determine edge profile center point
Generate Best Fit Circle
Determine NER radius and Theta Angle
502
504
506
508

FIG. 5

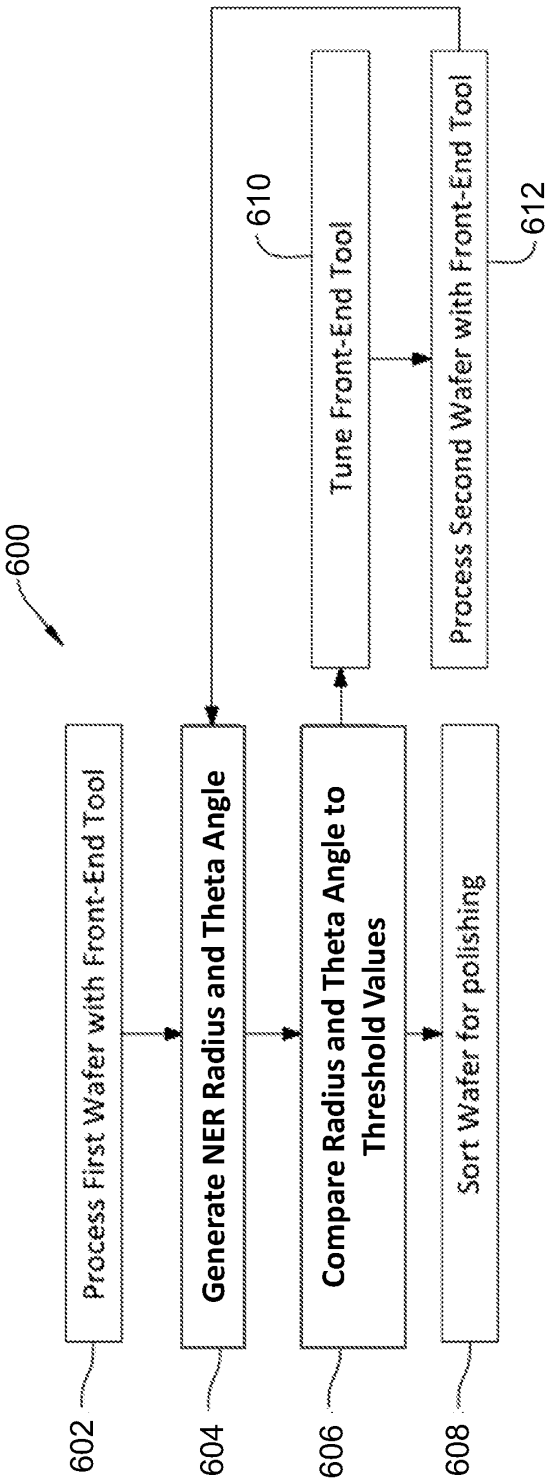
600
Process First Wafer with Front-End Tool
602
Generate NER Radius and Theta Angle
604
Compare Radius and Theta Angle to Threshold Values
606
Sort Wafer for polishing
608
Tune Front-End Tool
610
Process Second Wafer with Front-End Tool
612

FIG. 6

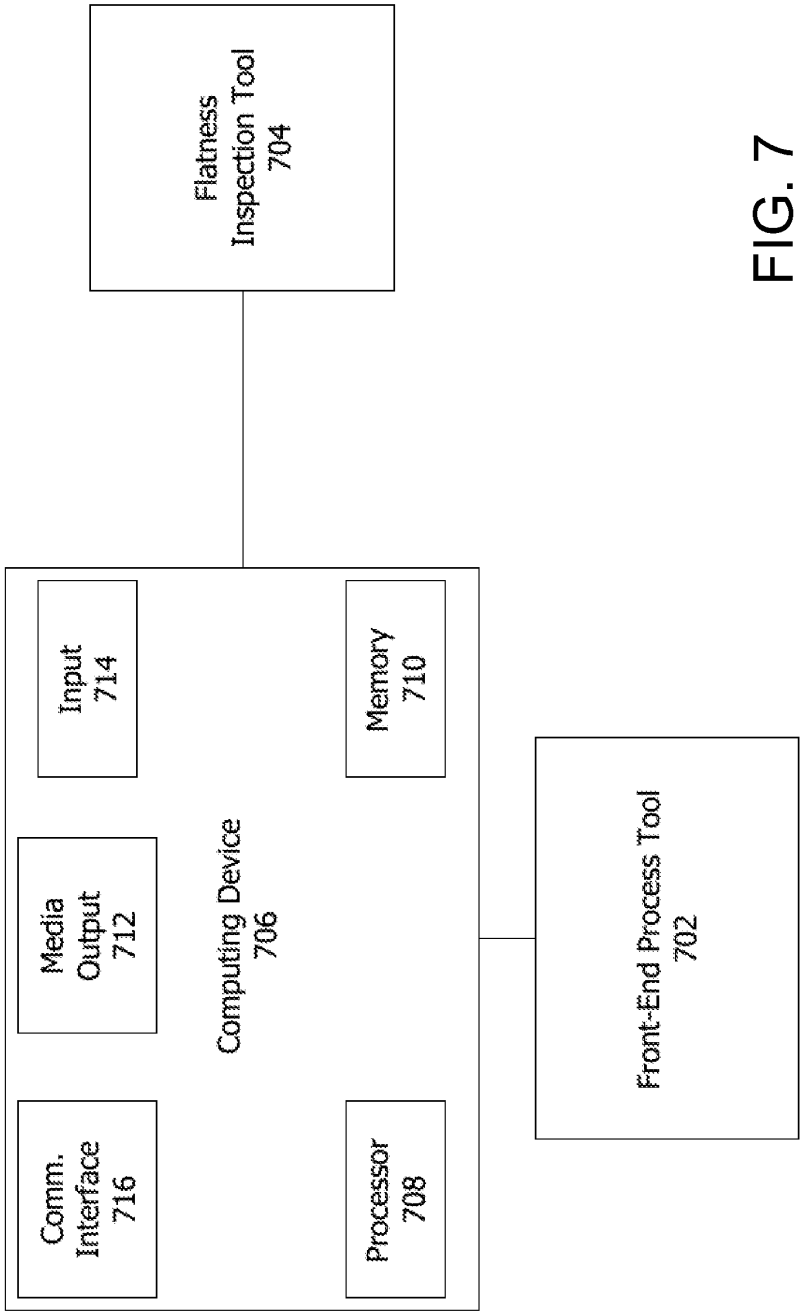
Flatness Inspection Tool 704
Input 714
Memory 710
Media Output 712
Computing Device 706
Comm. Interface 716
Processor 708
Front-End Process Tool 702

FIG. 7

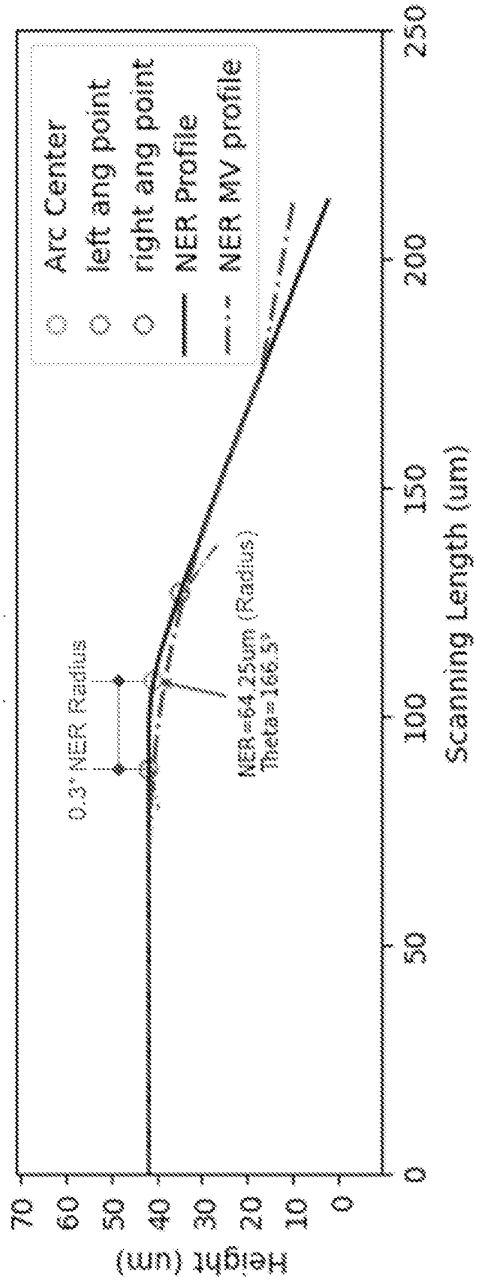
Arc Center
left ang point
right ang point
NER Profile
NER MV profile
0.3* NER Radius
NER=64.25um (Radius)
Theta=166.3°
Height (um)
Scanning Length (um)
0
10
20
30
40
50
60
70
0
50
100
150
200
250

FIG. 8

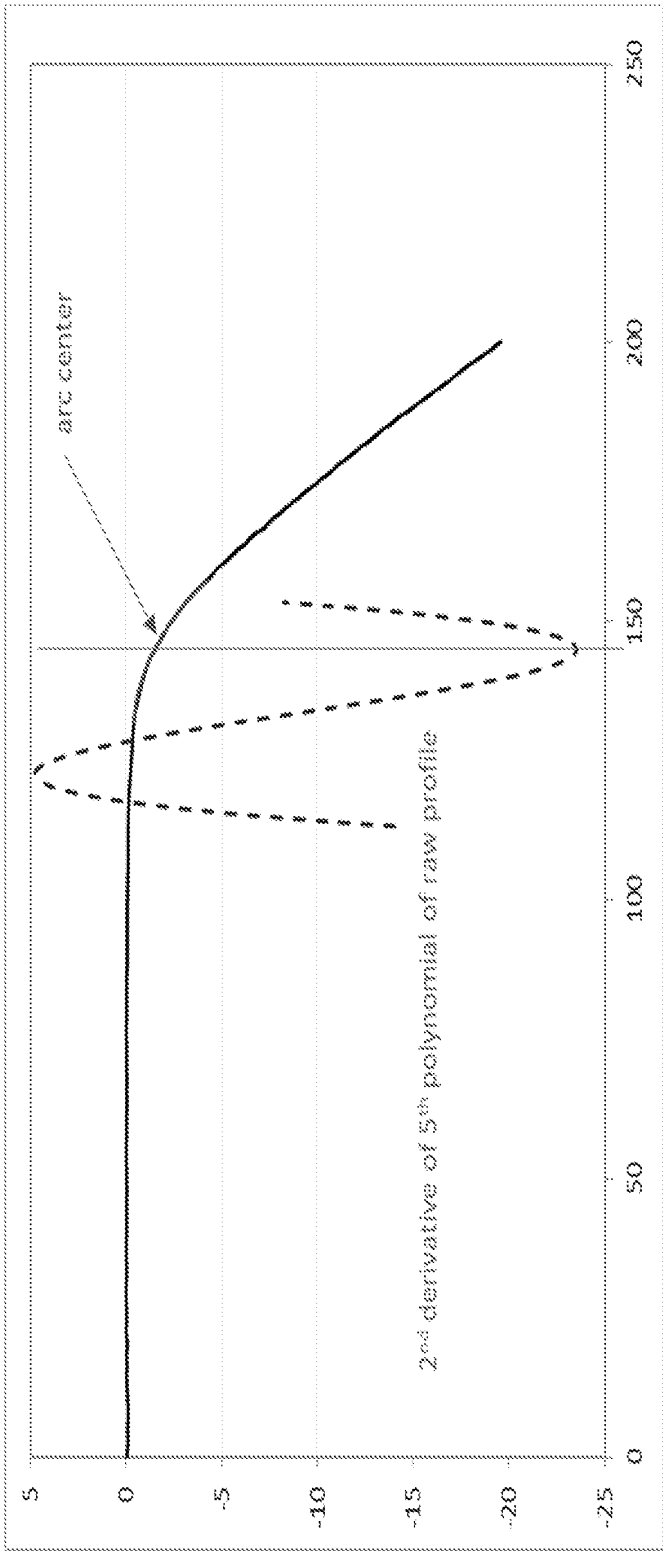
arc center
2nd derivative of 5th polynomial of raw profile
5
0
-5
-10
-15
-20
-25
0
50
100
150
200
250

FIG. 9

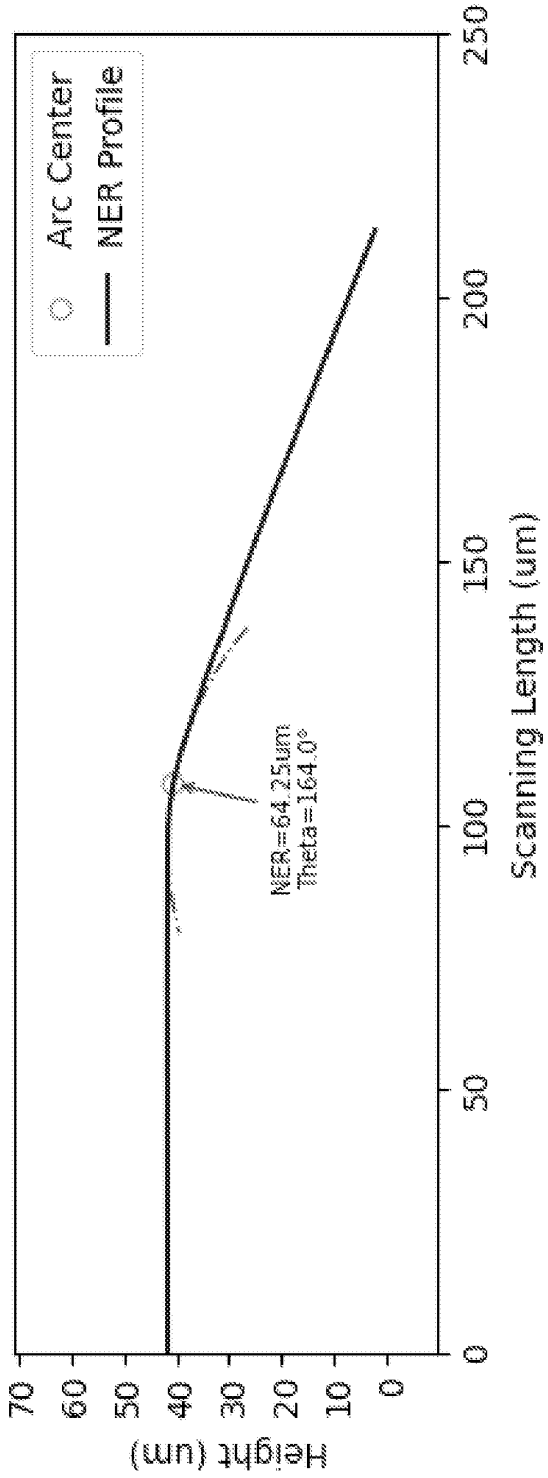
Arc Center
NER Profile
NEA=64.25um
Theta=164.0°
Height (um)
Scanning Length (um)
0
10
20
30
40
50
60
70
0
50
100
150
200
250

FIG. 10

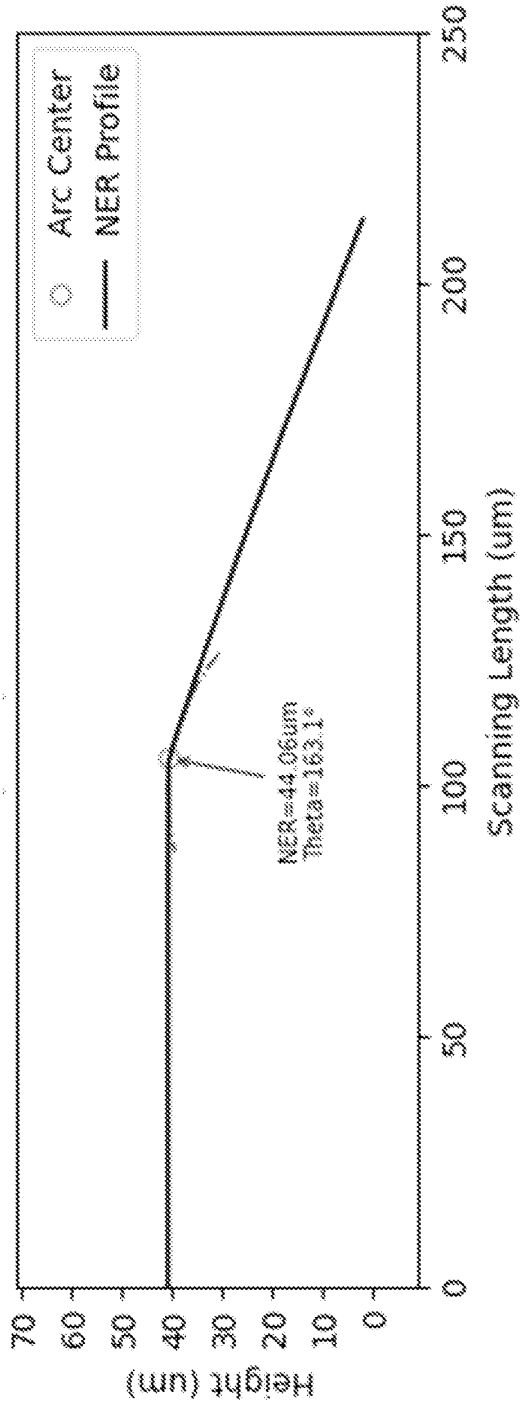
Arc Center
NER Profile
NER=44.06um
Theta=163.1°
Height (um)
Scanning Length (um)
0
10
20
30
40
50
60
70
0
50
100
150
200
250

FIG. 11

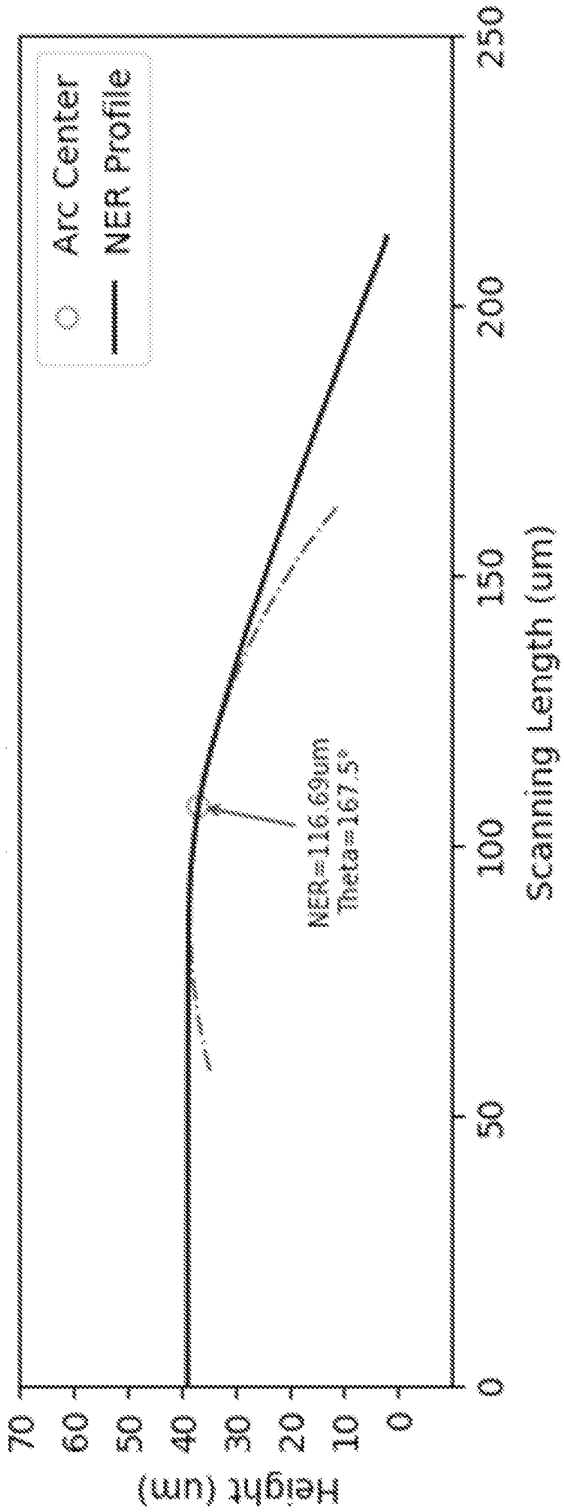
Arc Center
NER Profile
NER=116.69um
Theta=167.5°
Height (um)
Scanning Length (um)
0
10
20
30
40
50
60
70
0
50
100
150
200
250

FIG. 12

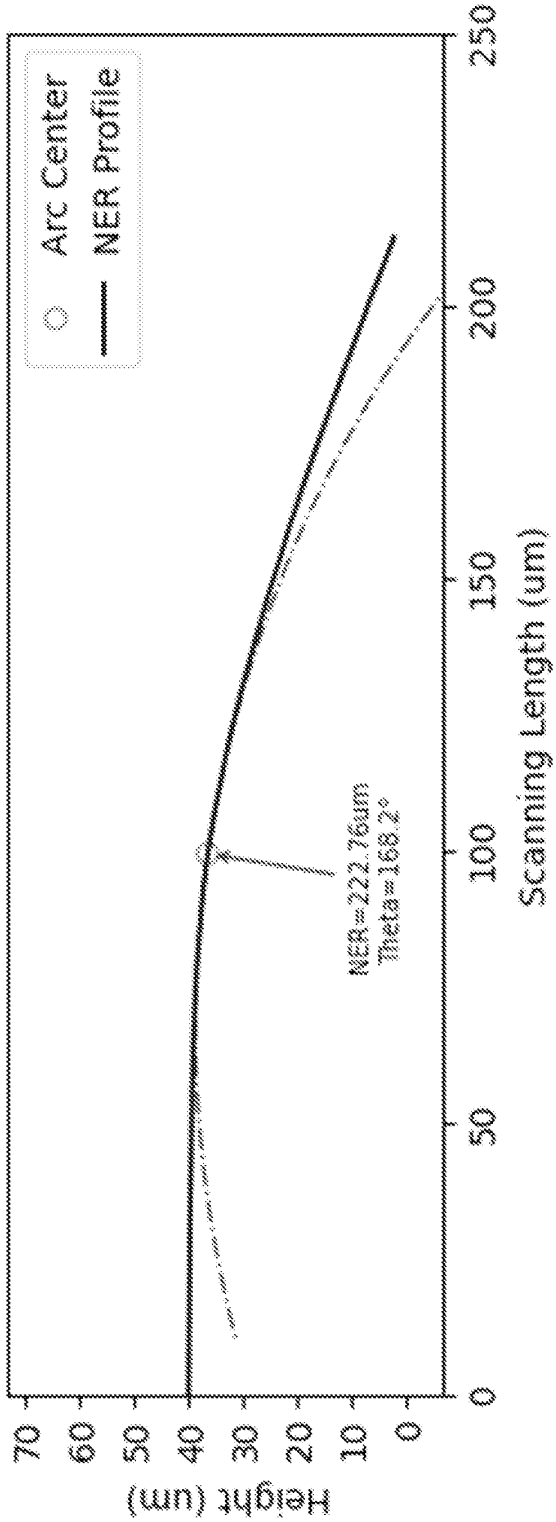
Arc Center
NER Profile
NER=222.76um
Theta=168.2°
Height (um)
Scanning Length (um)
0
10
20
30
40
50
60
70
0
50
100
150
200
250

FIG. 13