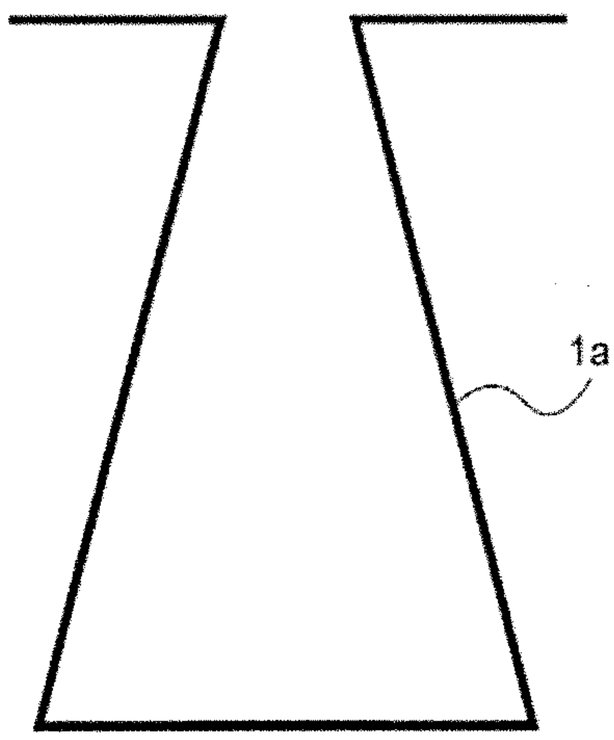


FIG. 1a

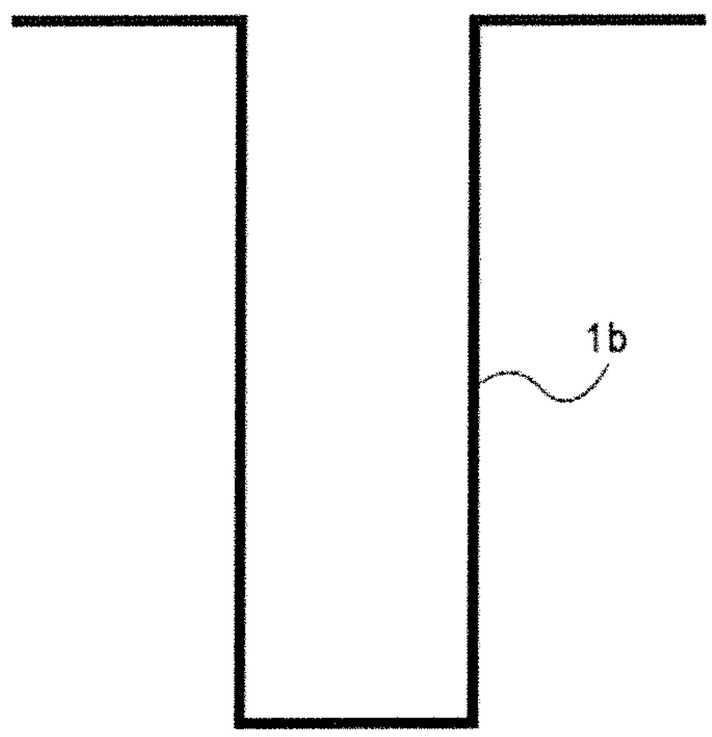


FIG. 1b

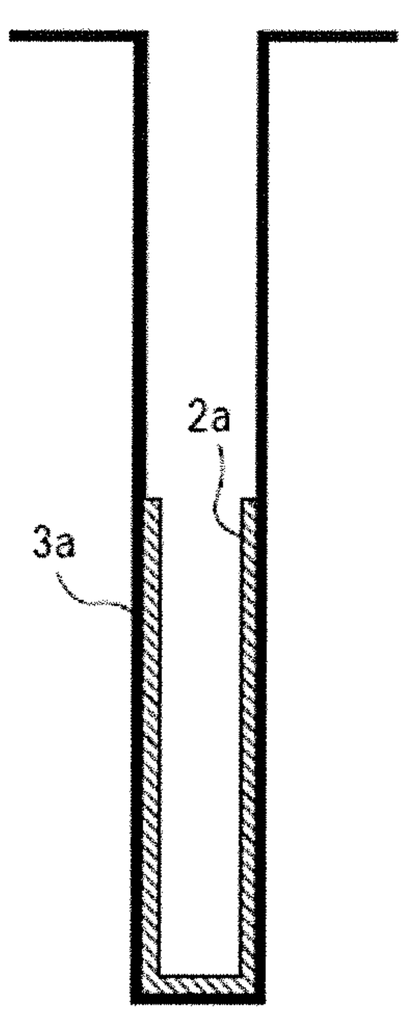


FIG. 2a

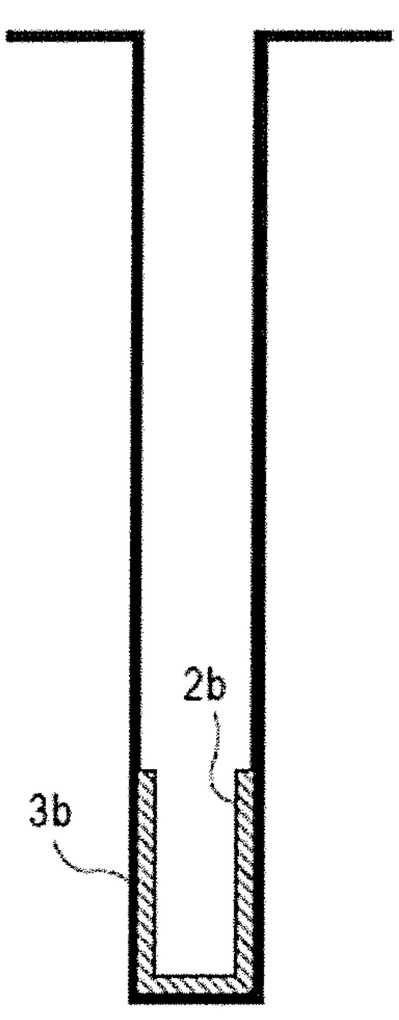


FIG. 2b

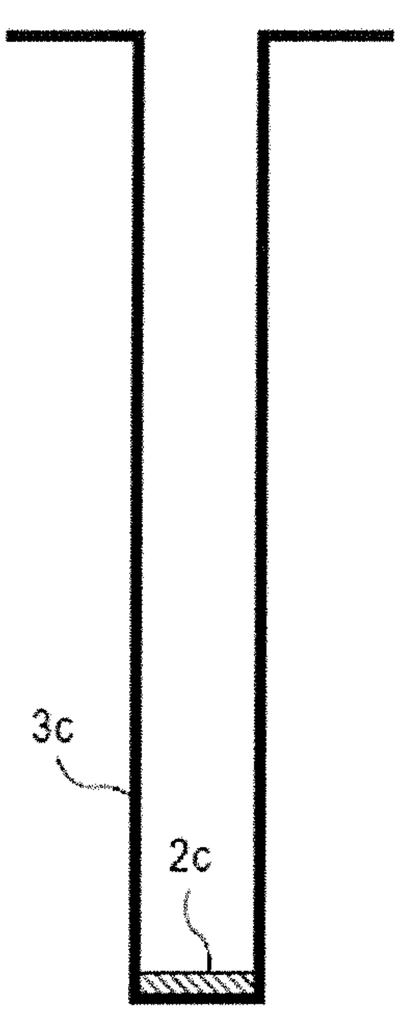


FIG. 2c

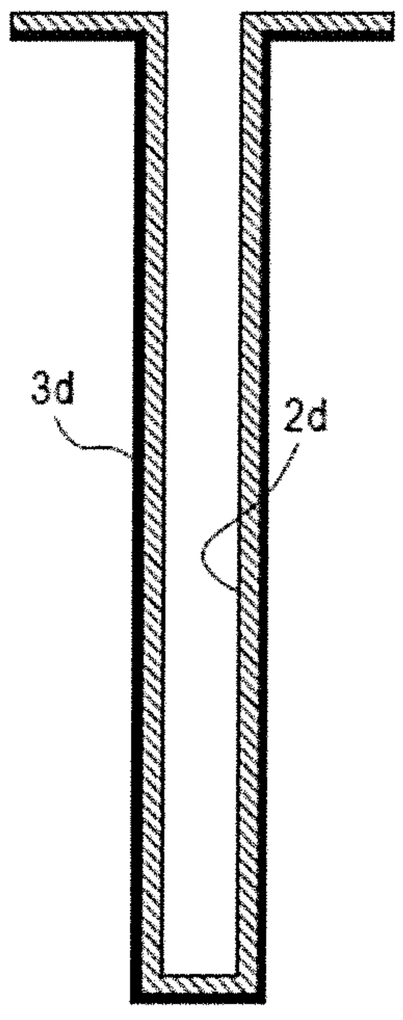


FIG. 2d

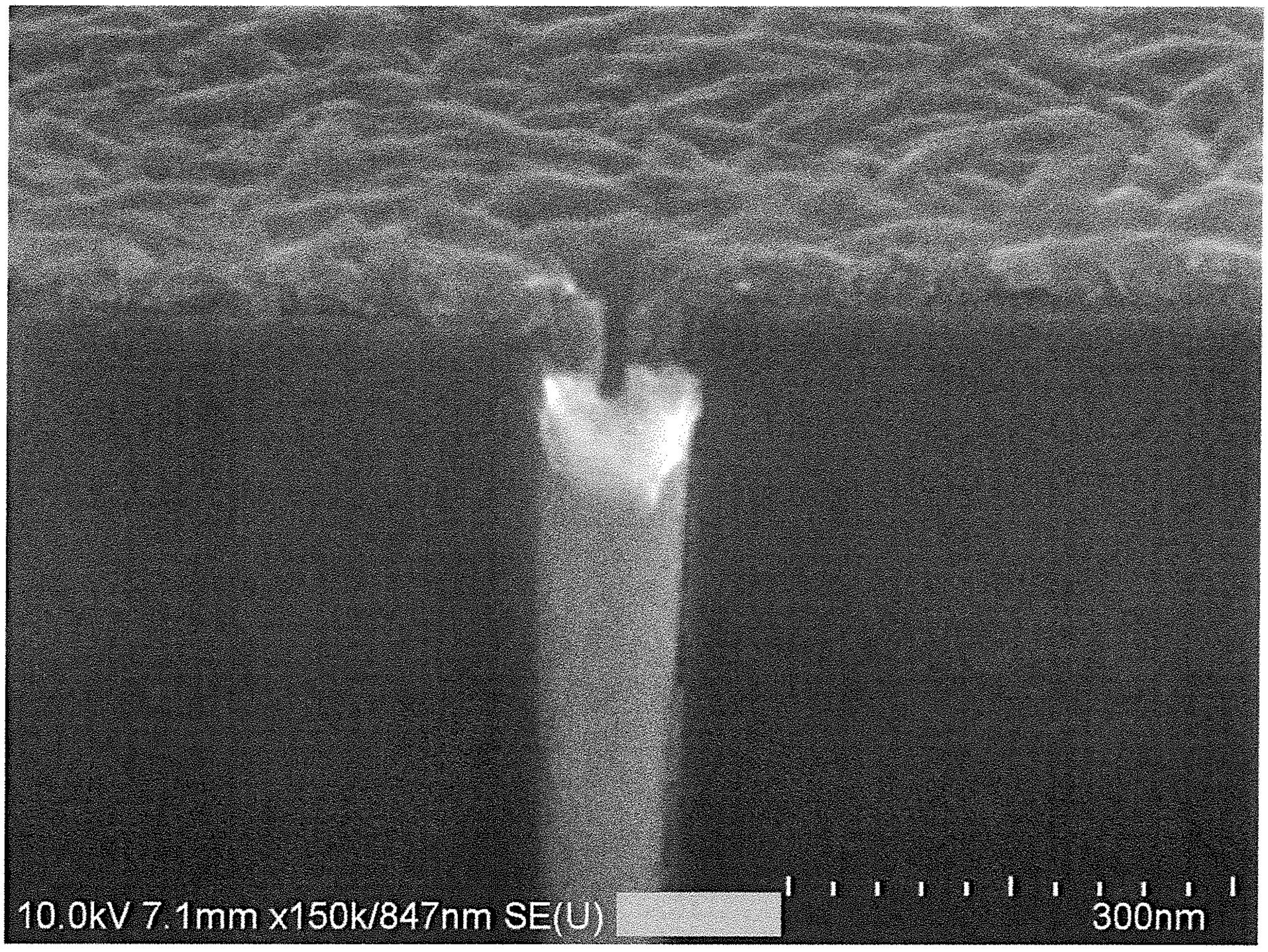


FIG. 3



FIG. 4

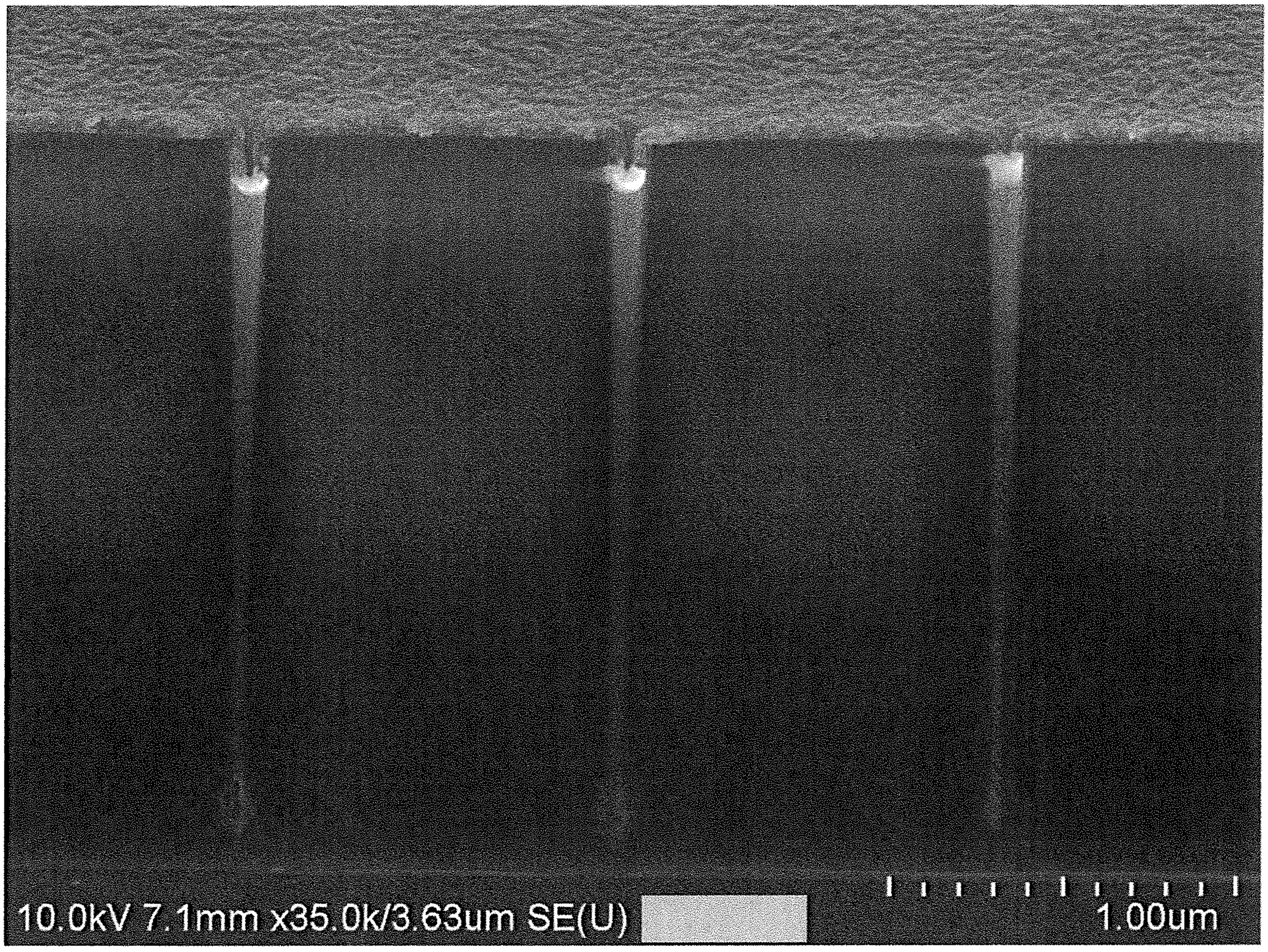


FIG. 5

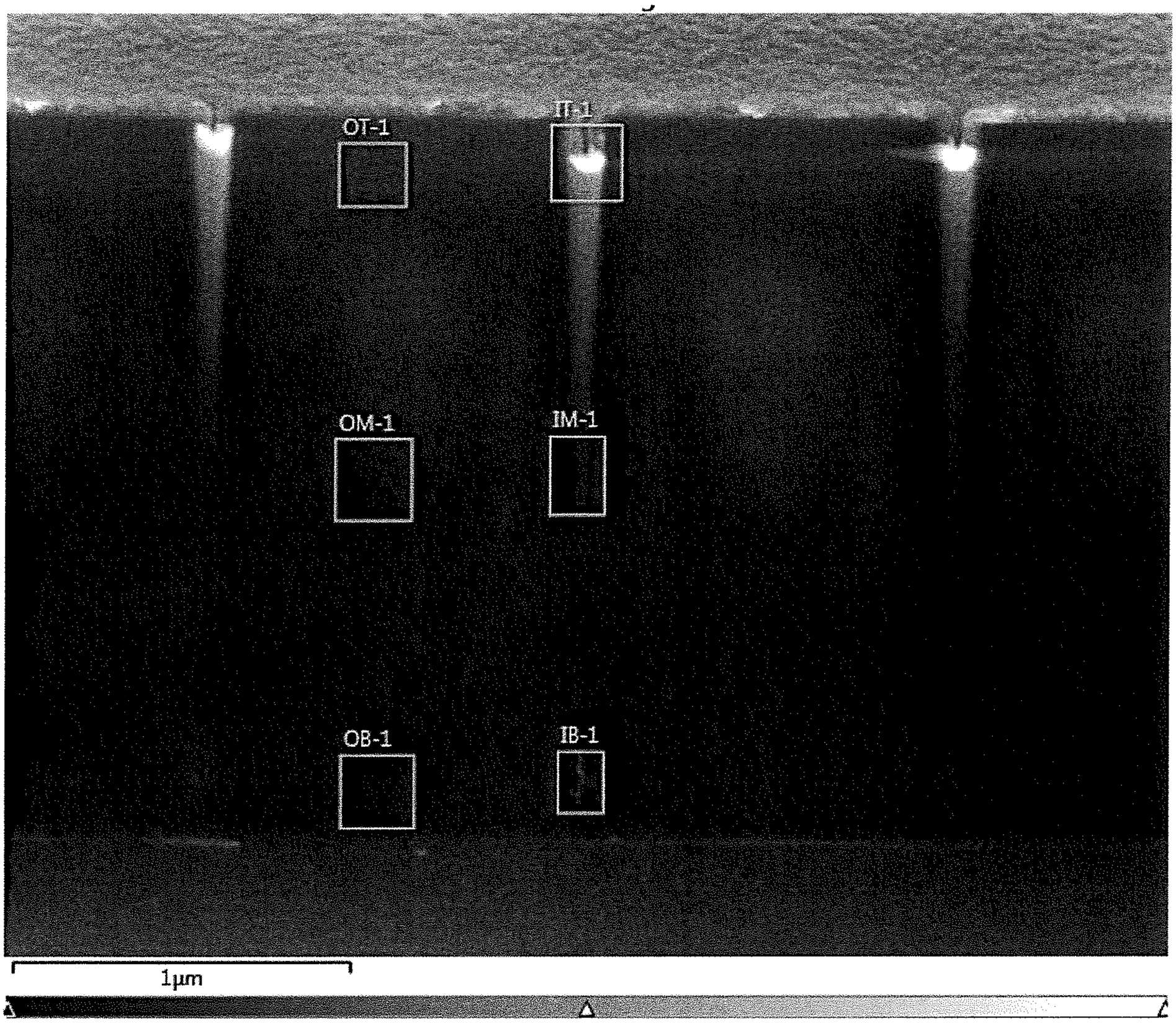


FIG. 6

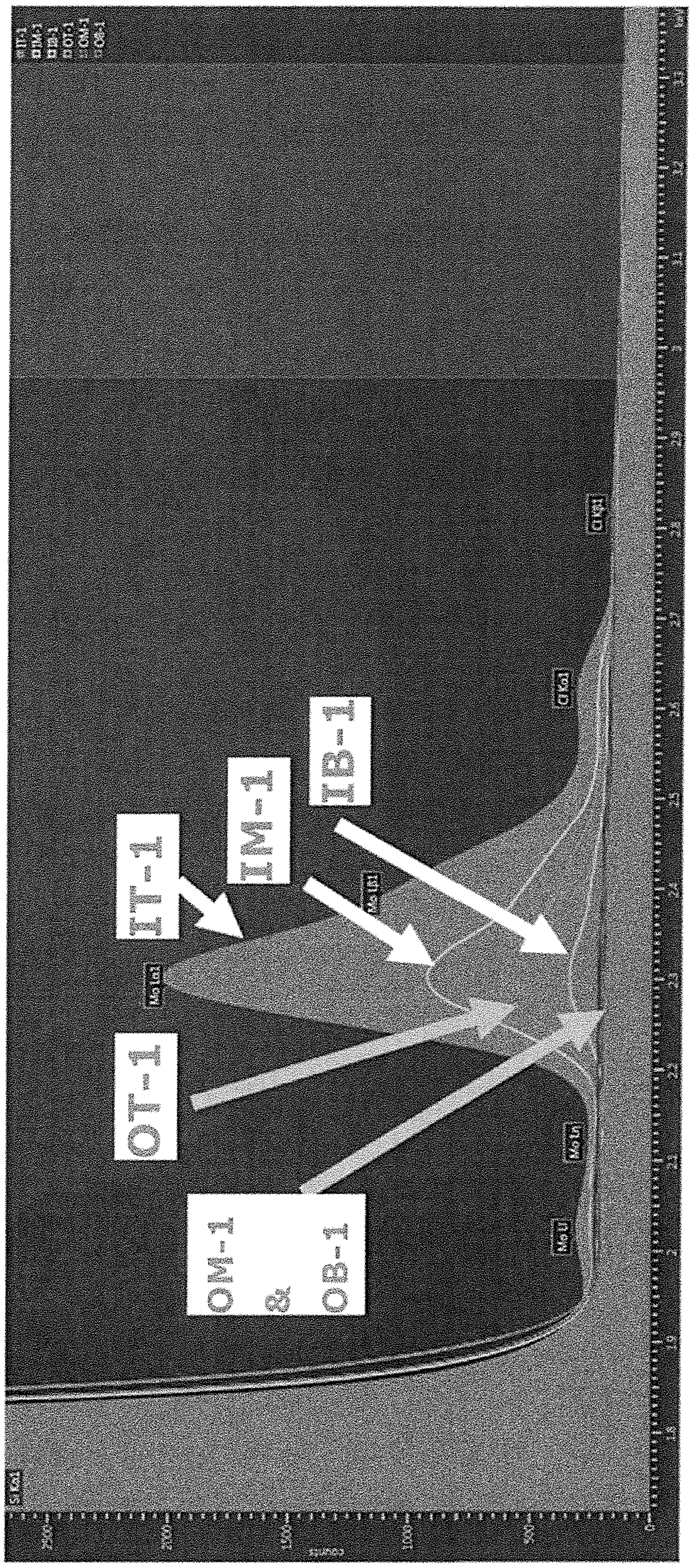


FIG. 7

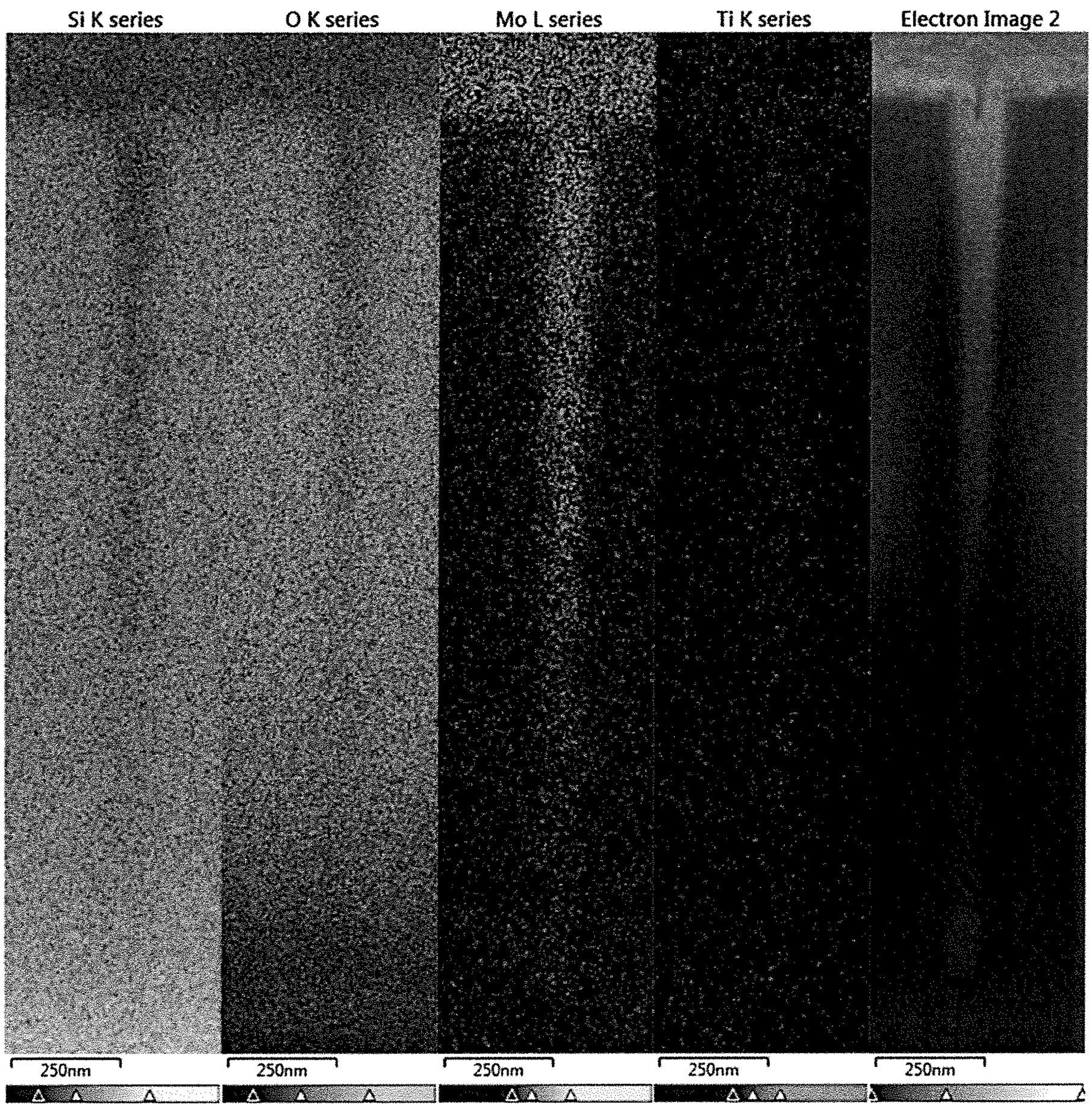
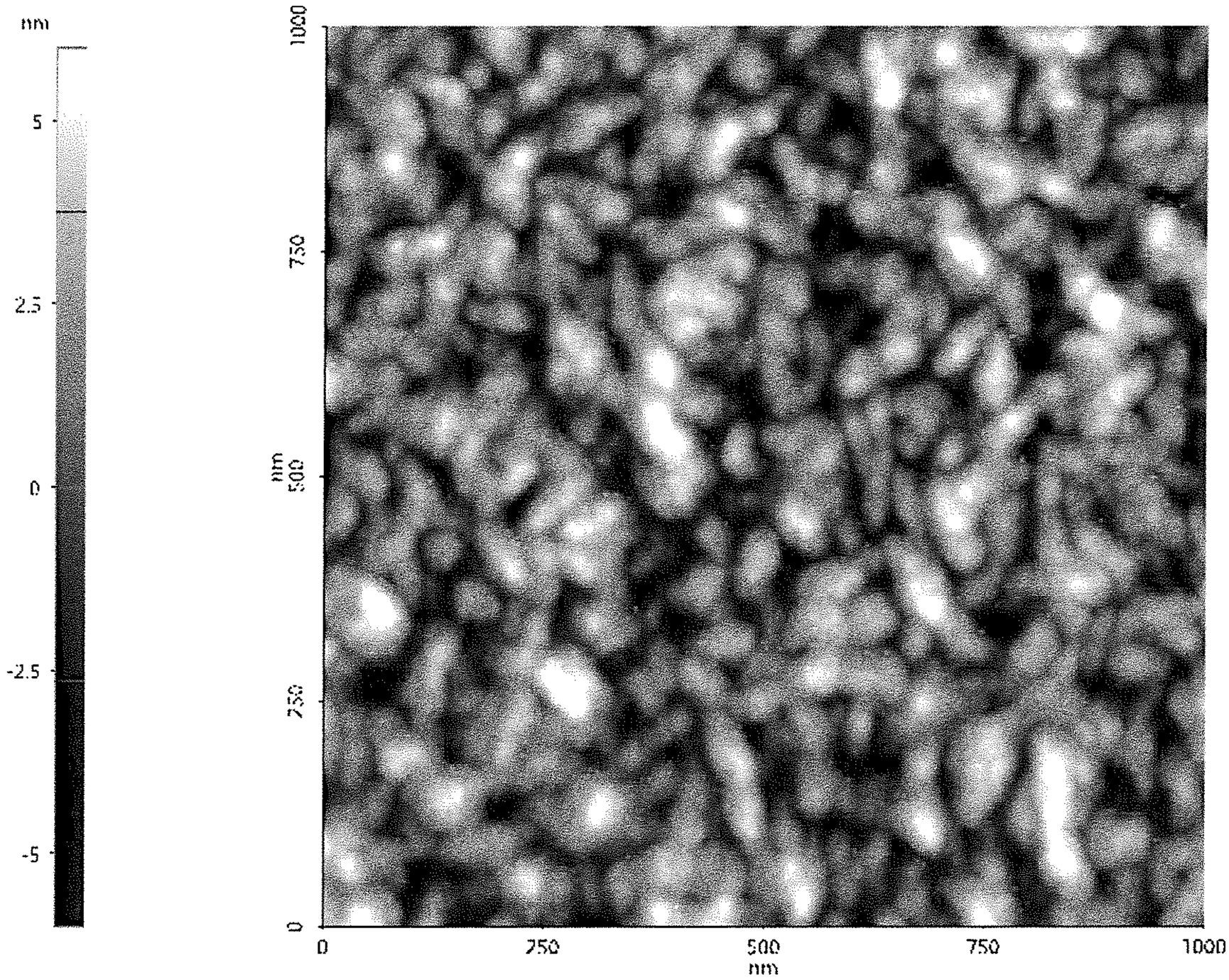
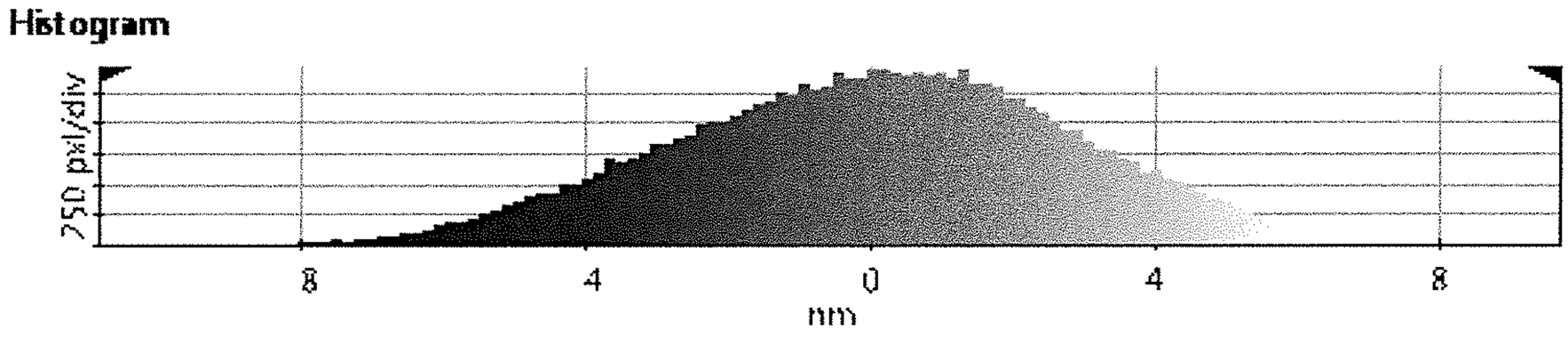

Si K series
O K series
Mo L series
Ti K series
Electron Image 2
250nm
250nm
250nm
250nm
250nm

FIG. 8


nm
5
2.5
0
-2.5
-5
1000
750
500
250
0
nm
0
250
500
750
1000
nm

a.


Histogram
250 pxl/div
8
4
0
4
8
nm

b.

FIG. 9

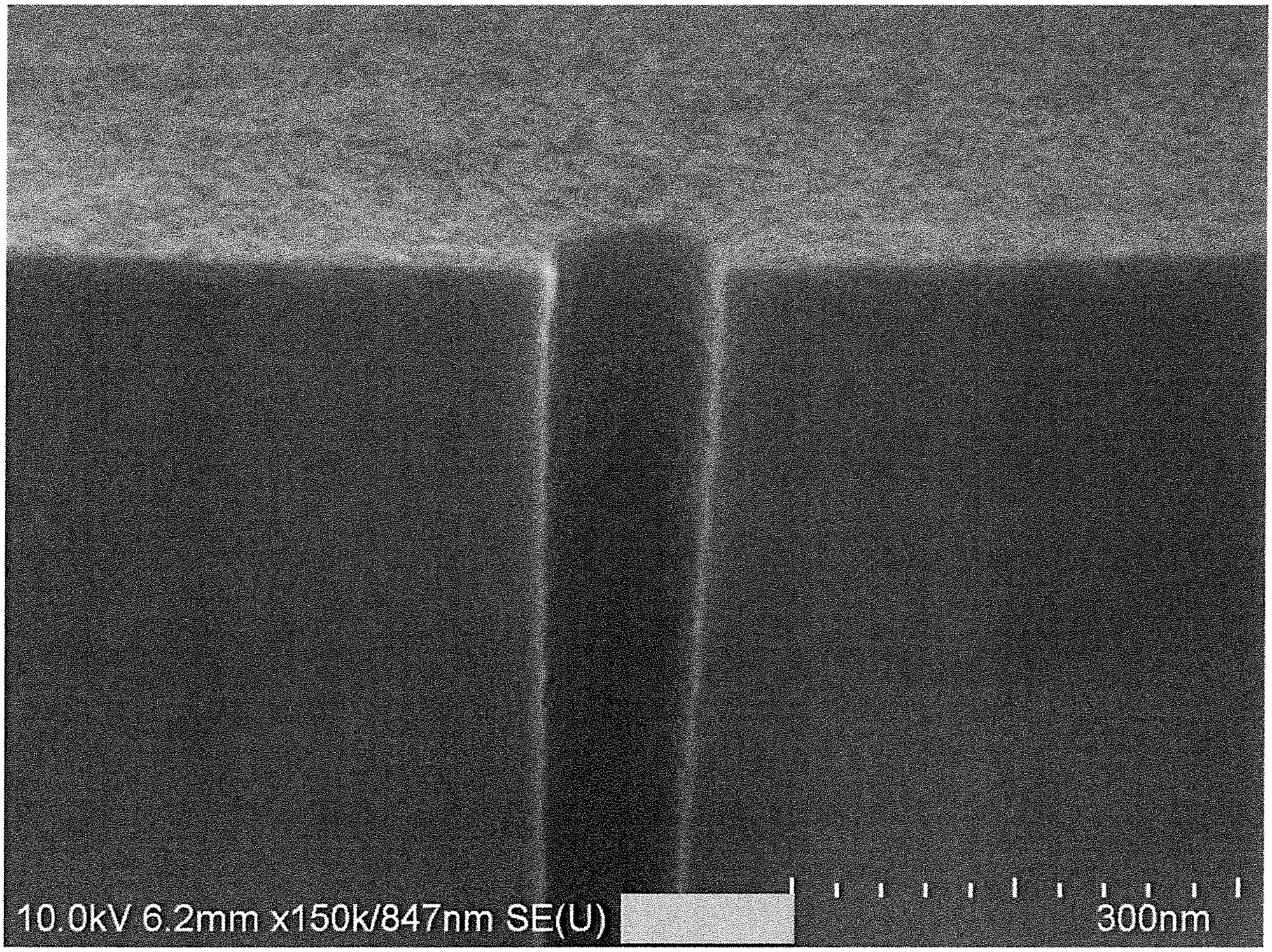


FIG. 10

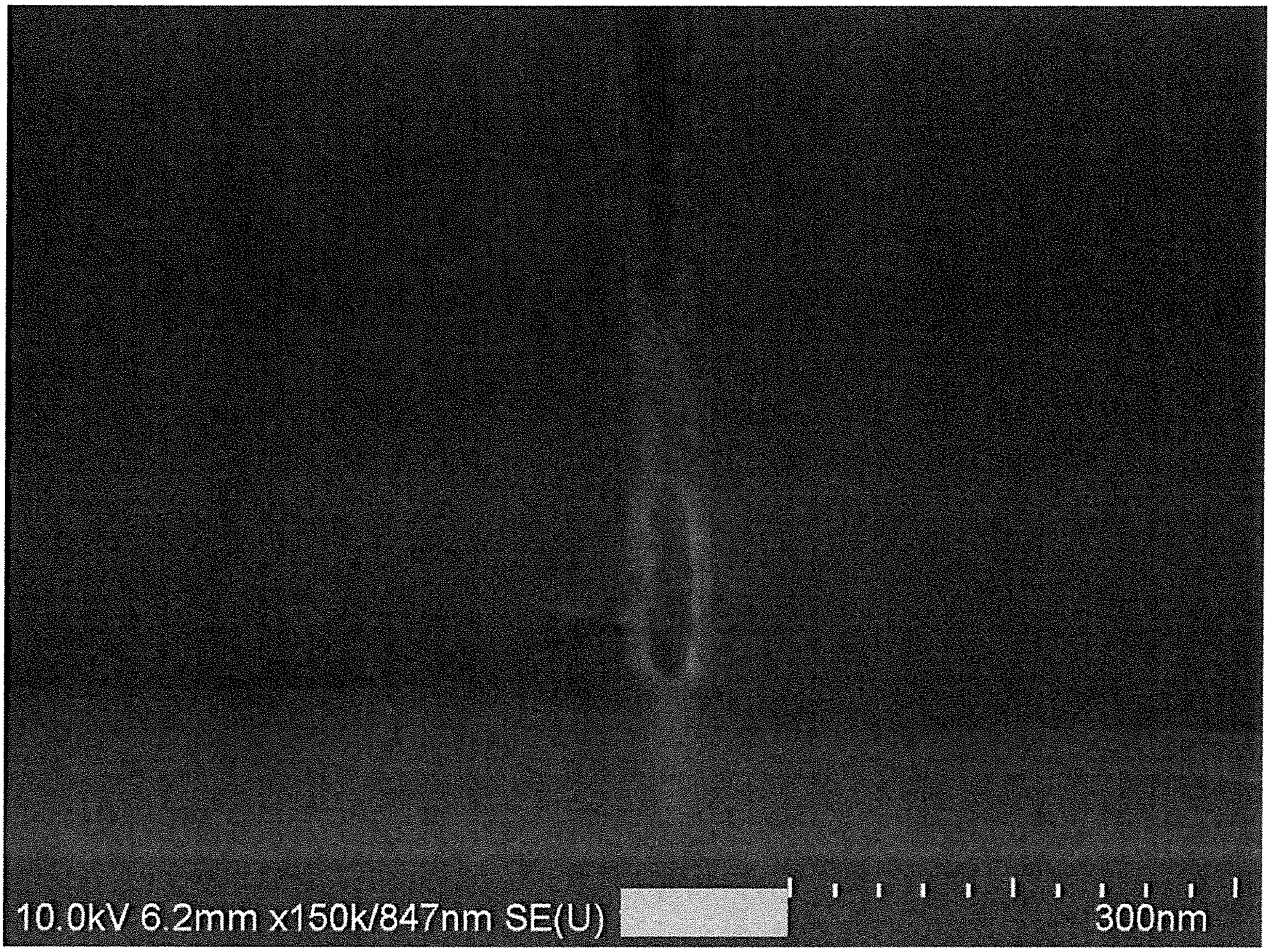


FIG. 11

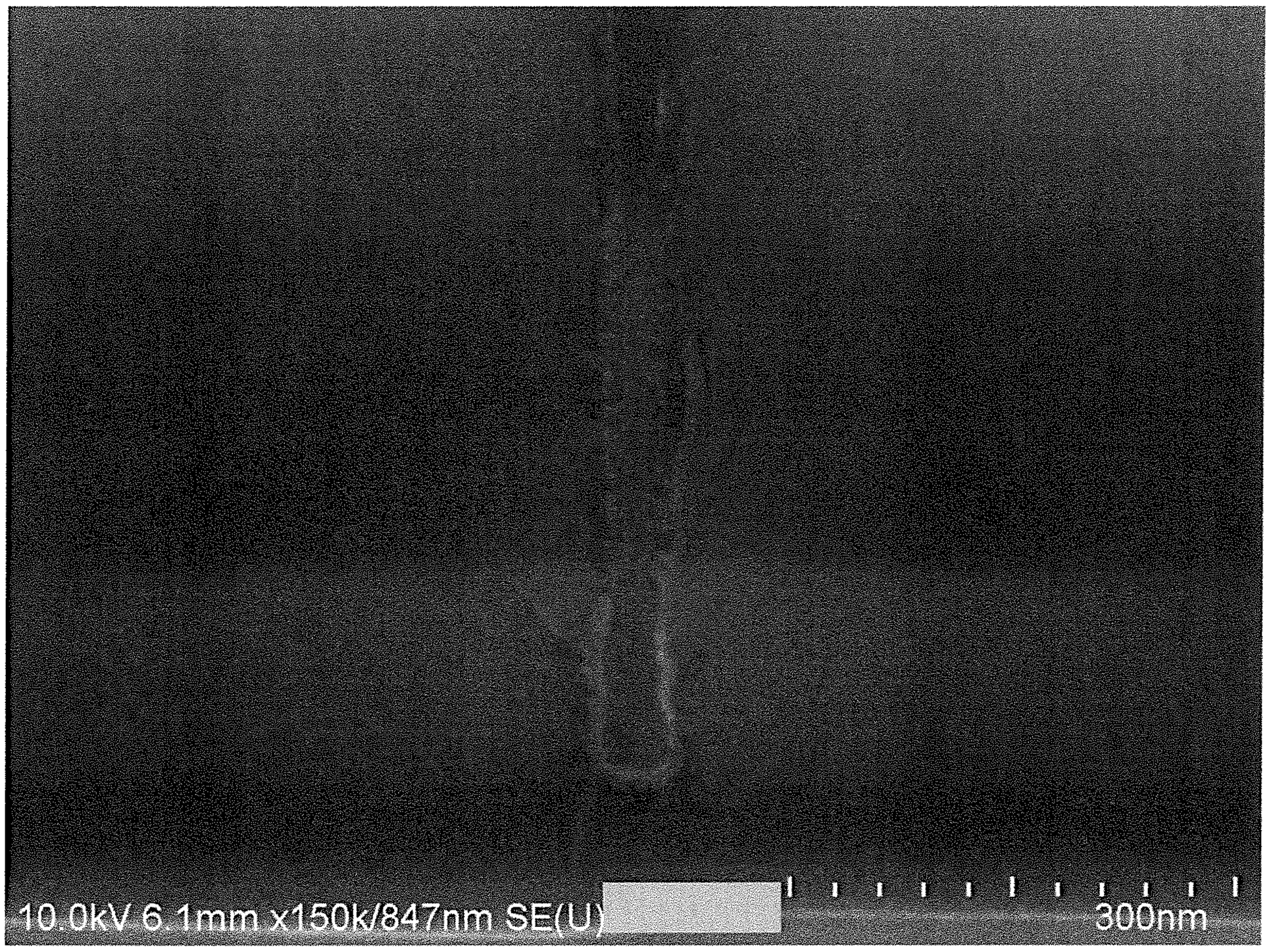


FIG. 12

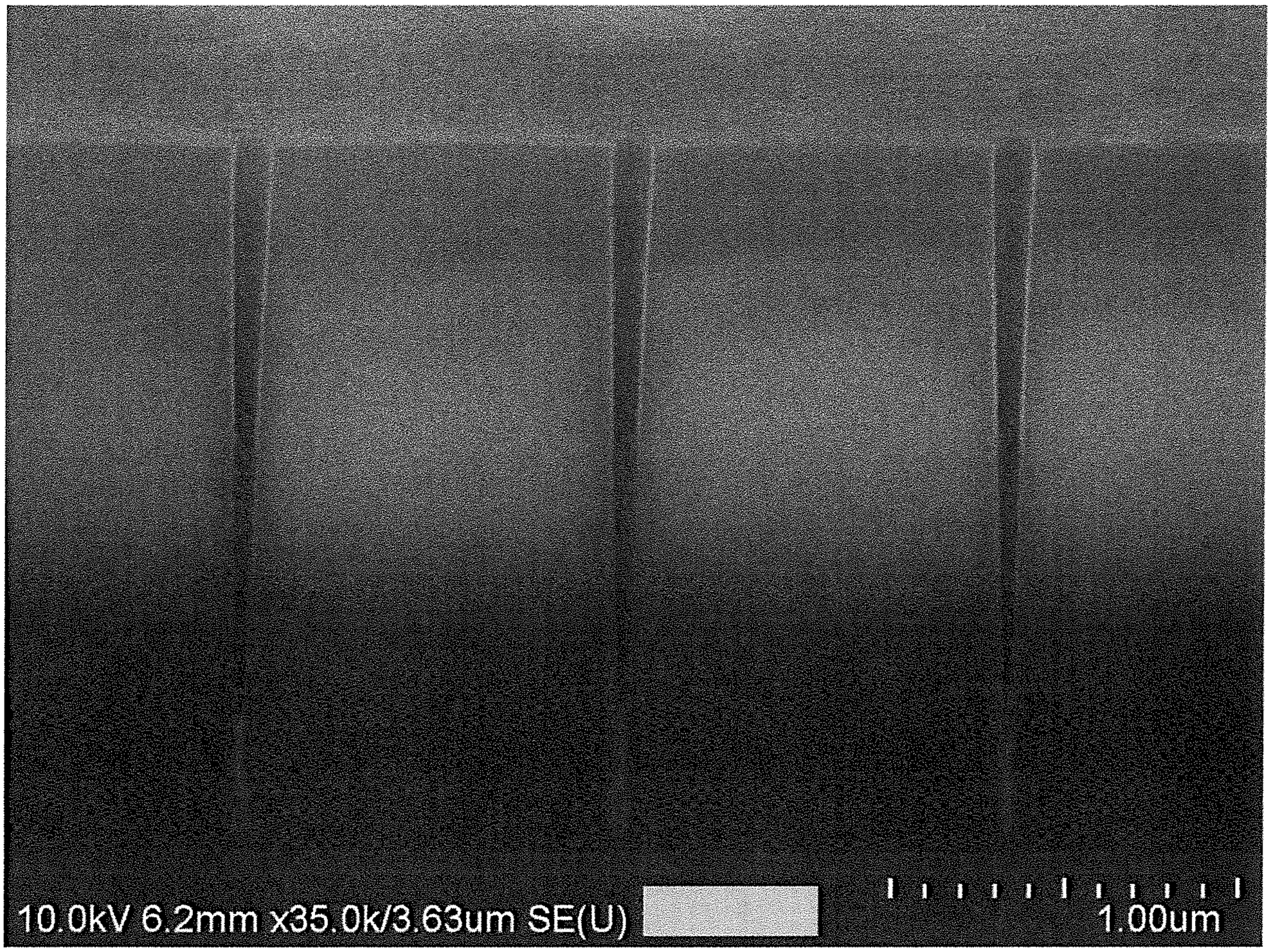


FIG. 13

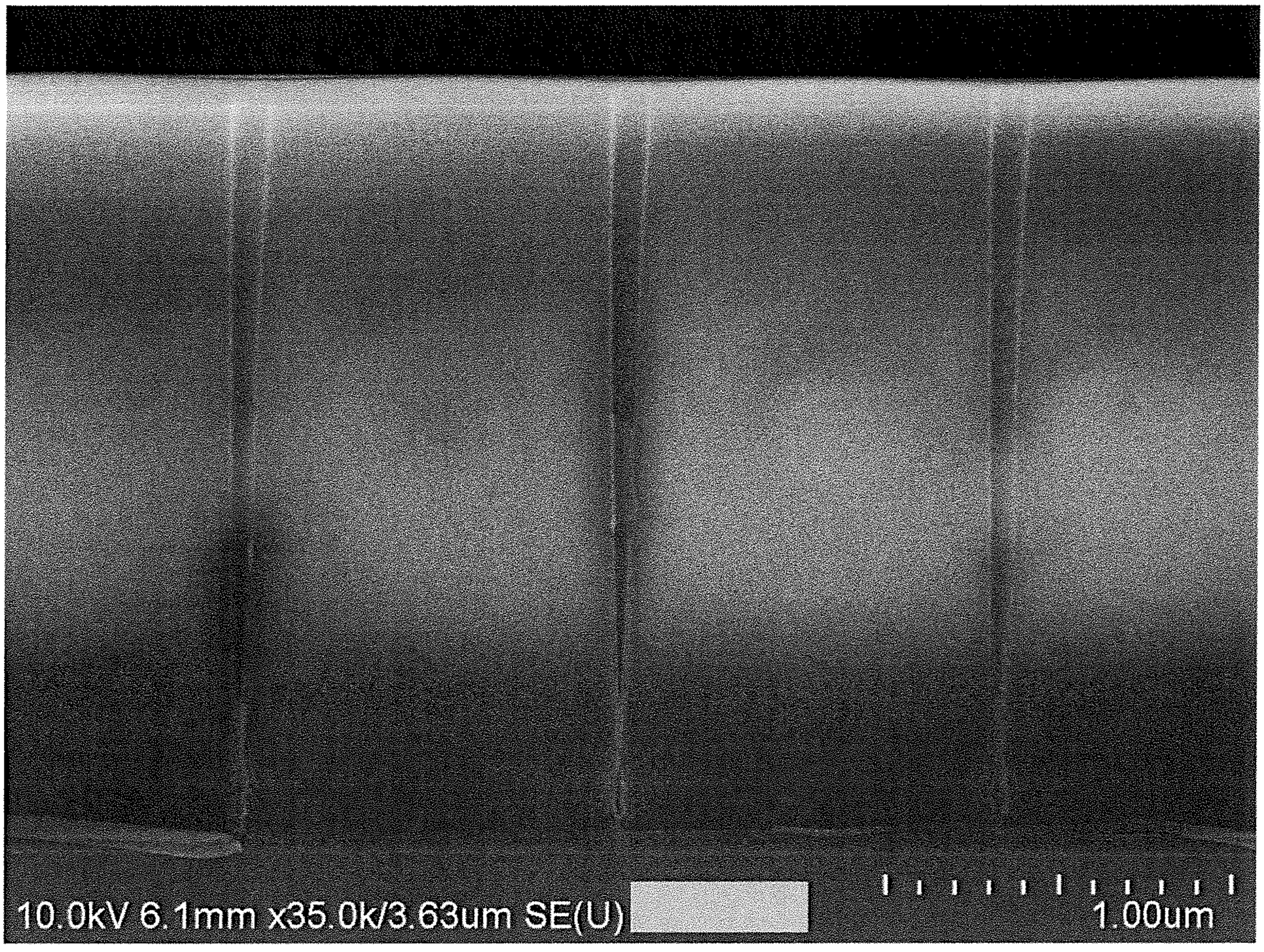


FIG. 14

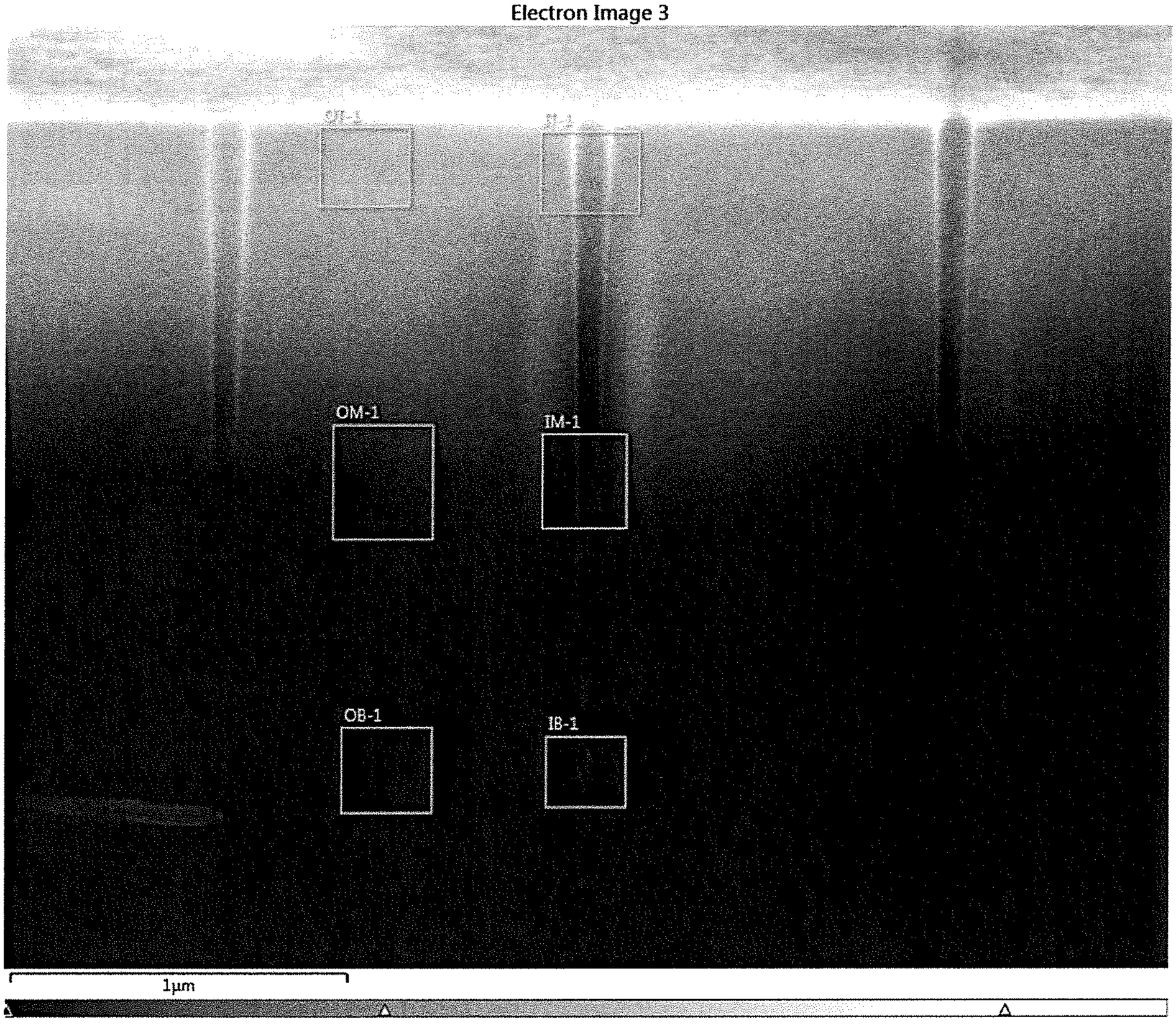
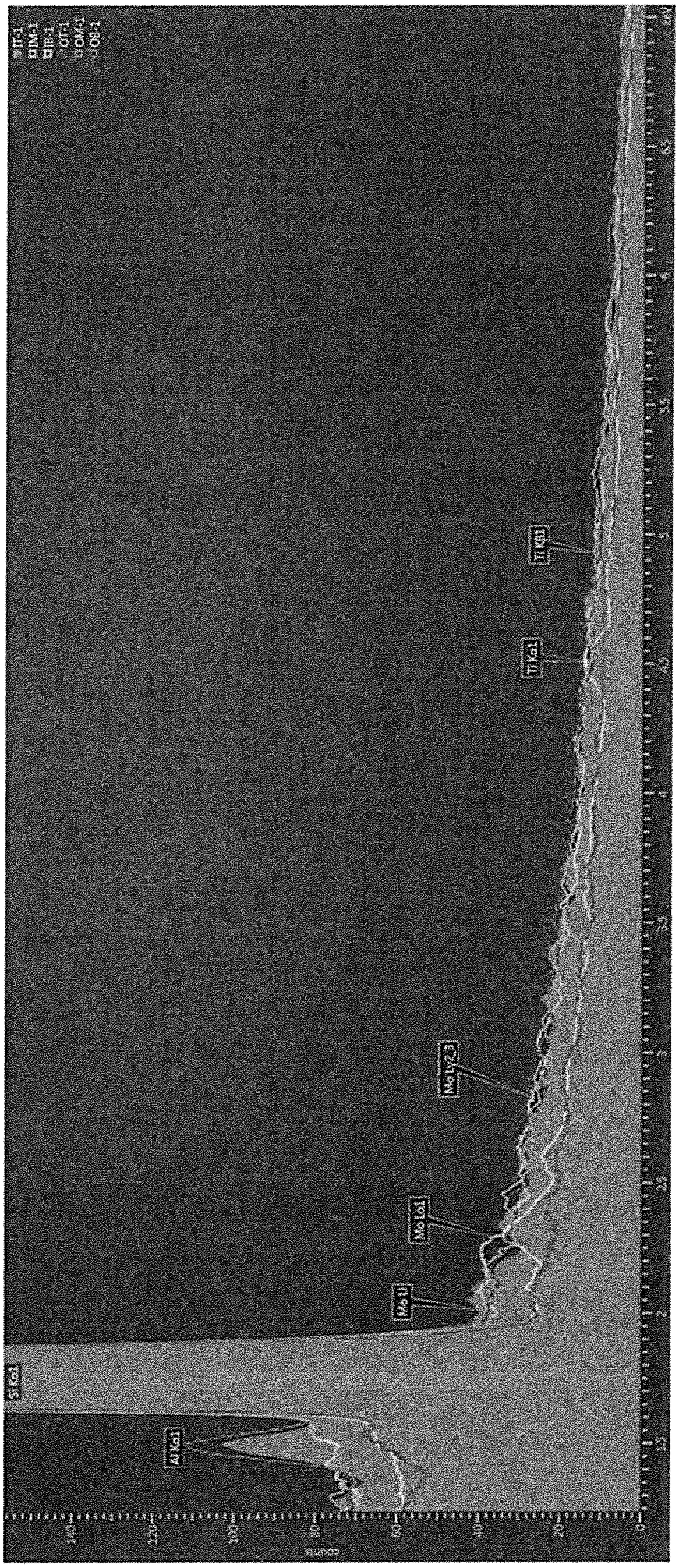
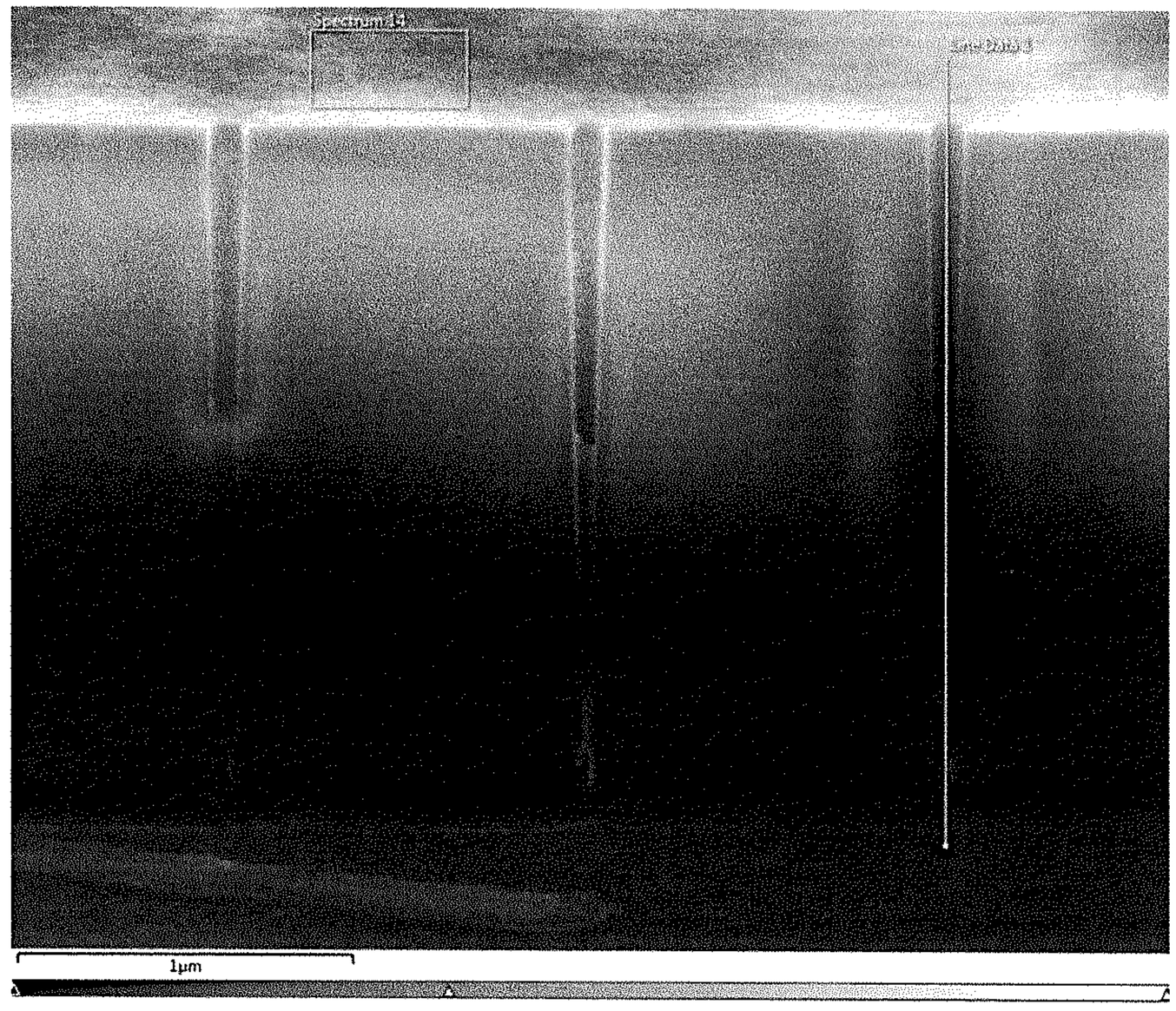


FIG. 15

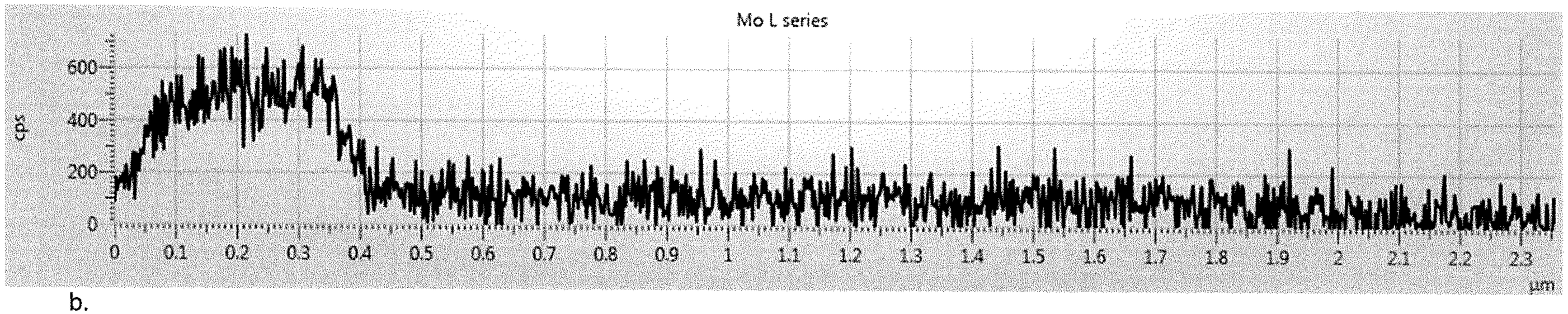

Ti-1
Mo-1
Al-1
Si-1
Ti-2
Mo-2
Al-2
Si-2
Ti Ka1
Ti Ka1
Mo Ly2,3
Mo La1
Mo L1
Al Ka1
Si Ka1
counts
keV

16/75

FIG. 16



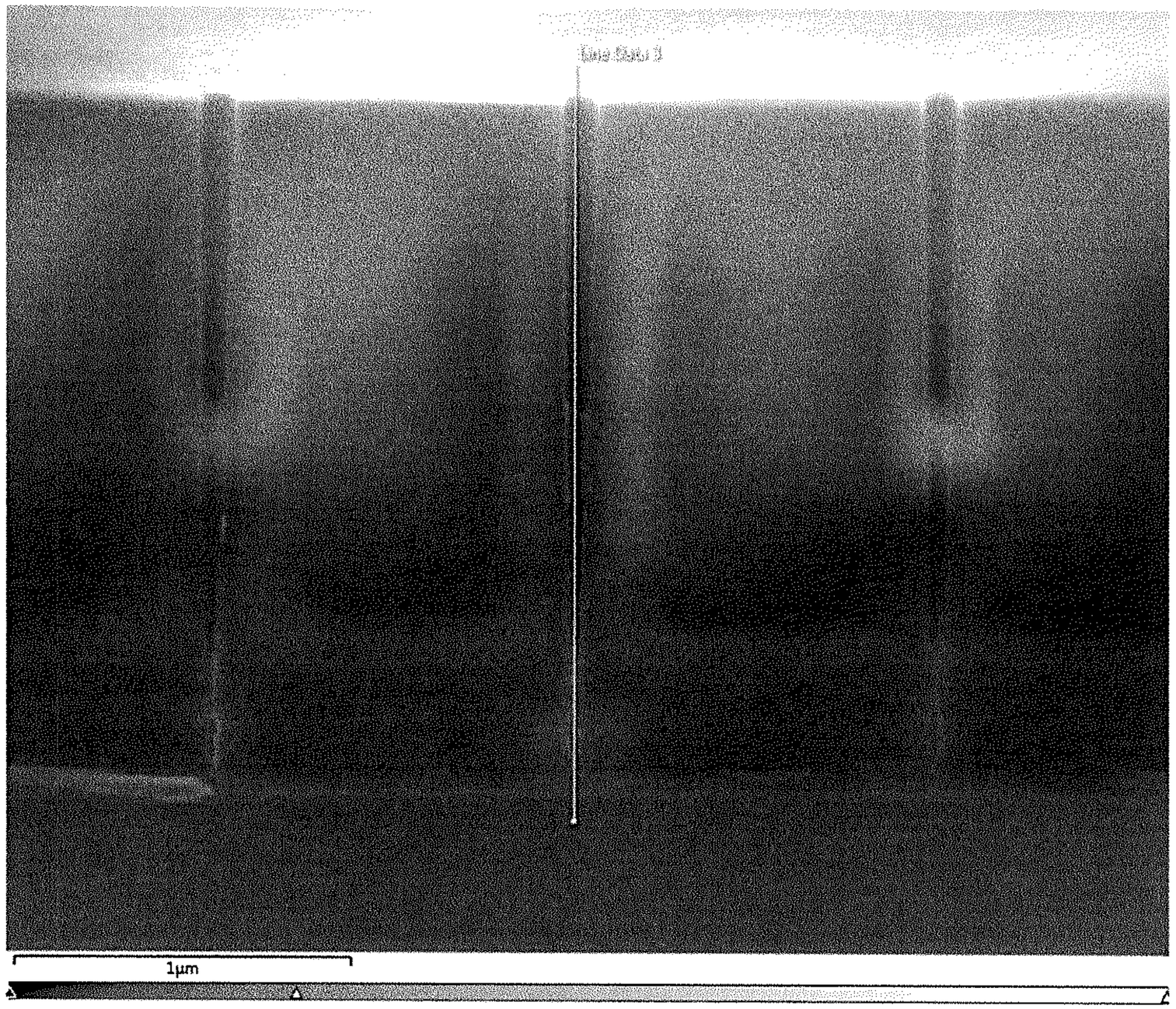
a.



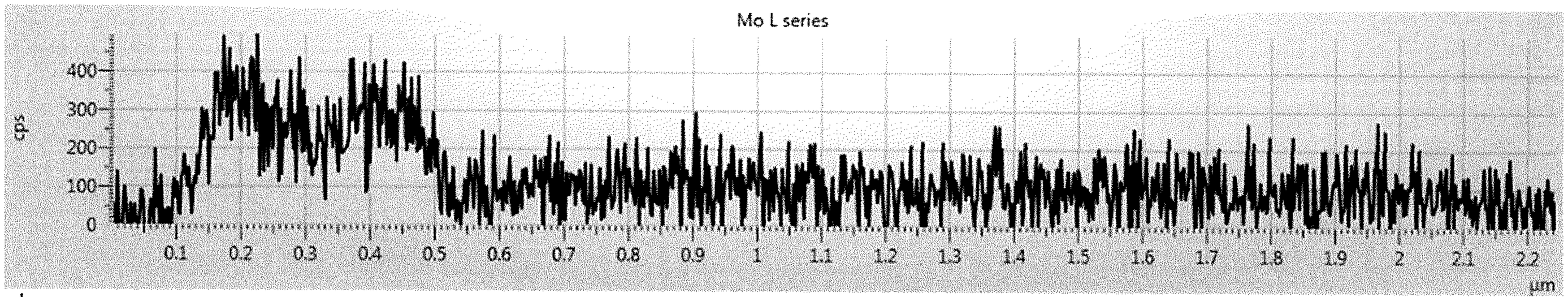
b.

FIG. 17

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PCT/EP2018/066820



a.



b.

FIG. 18

WO 2018/234567
PCT/EP2018/066820

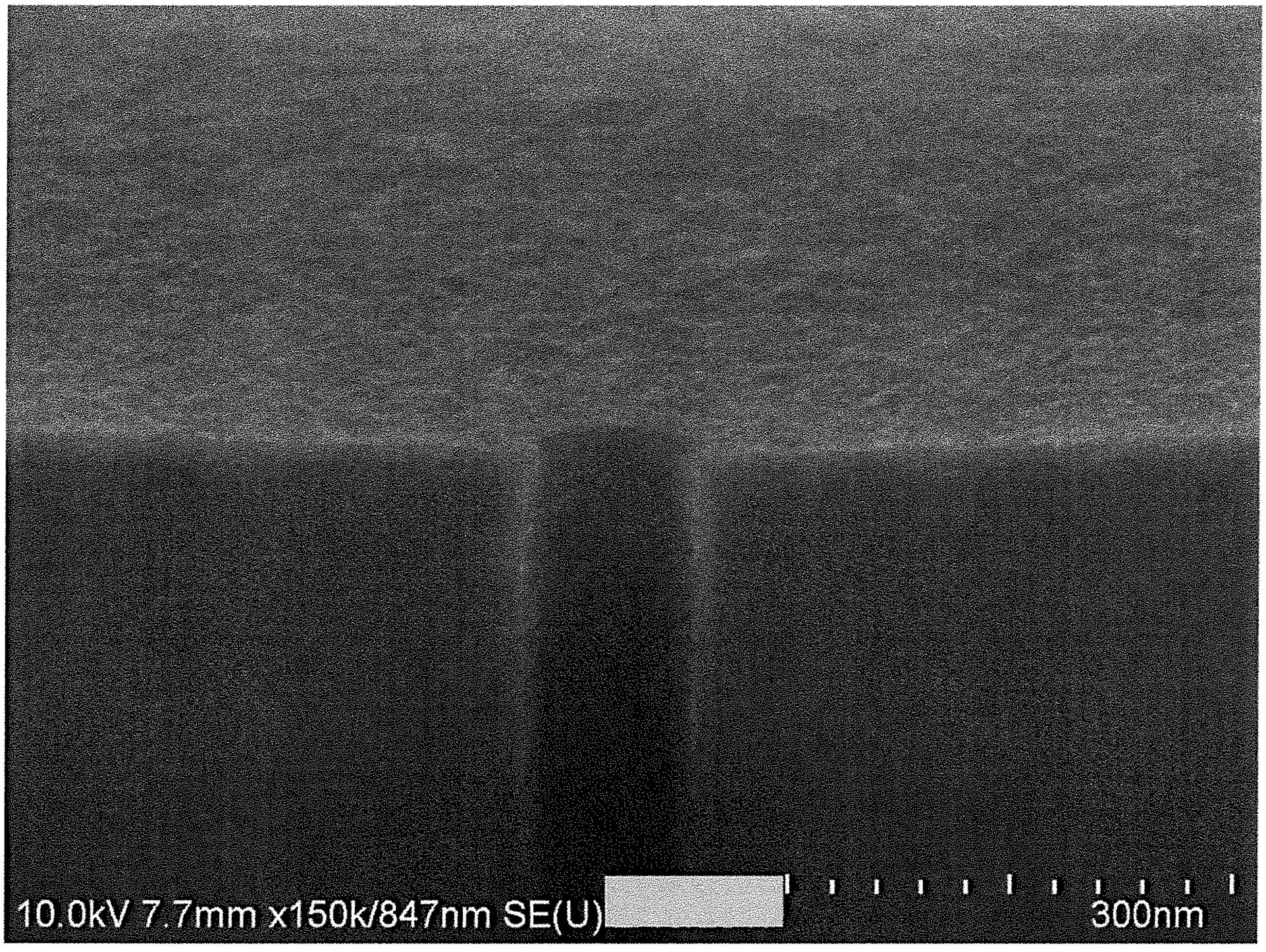


FIG. 19

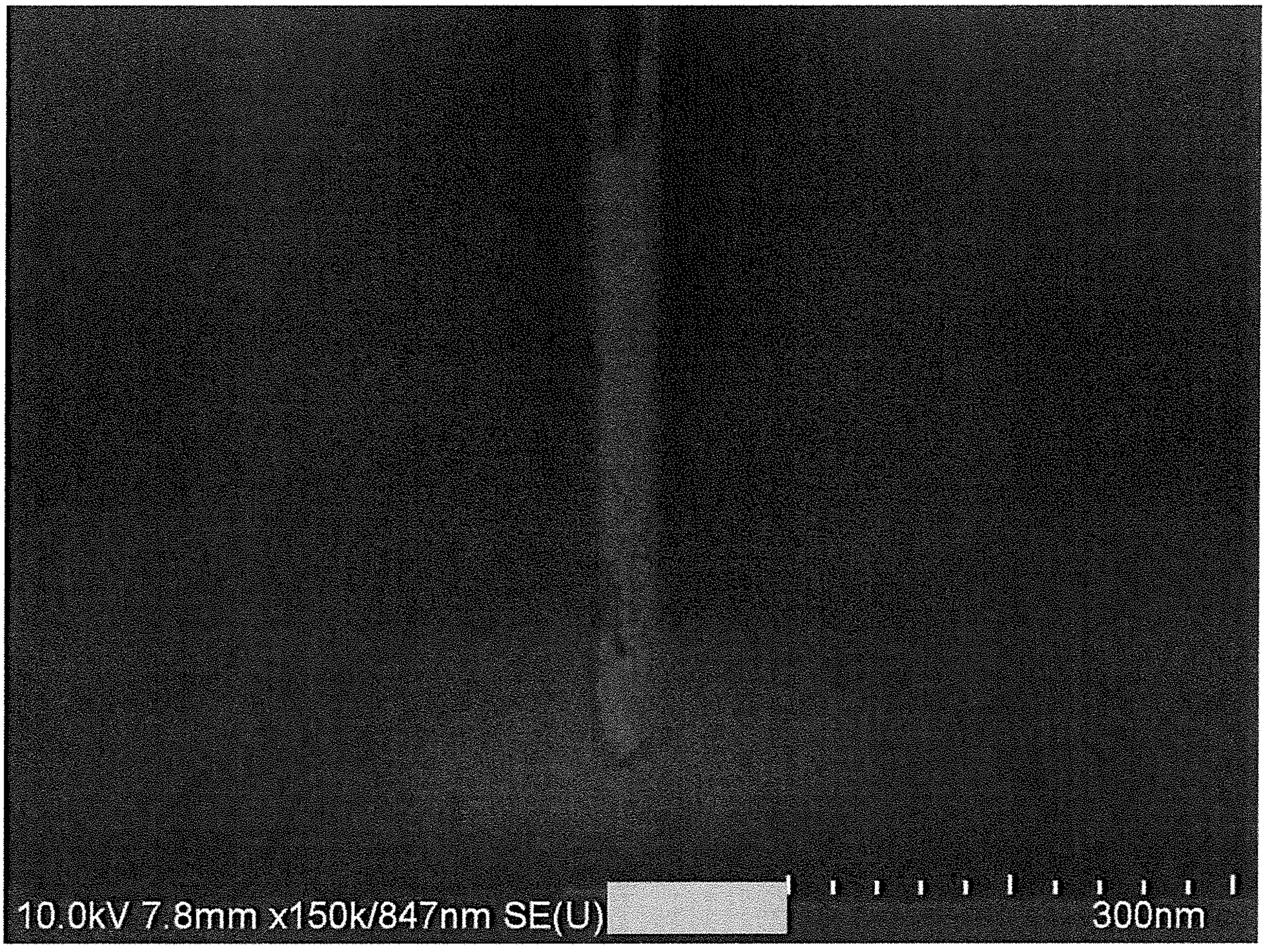


FIG. 20

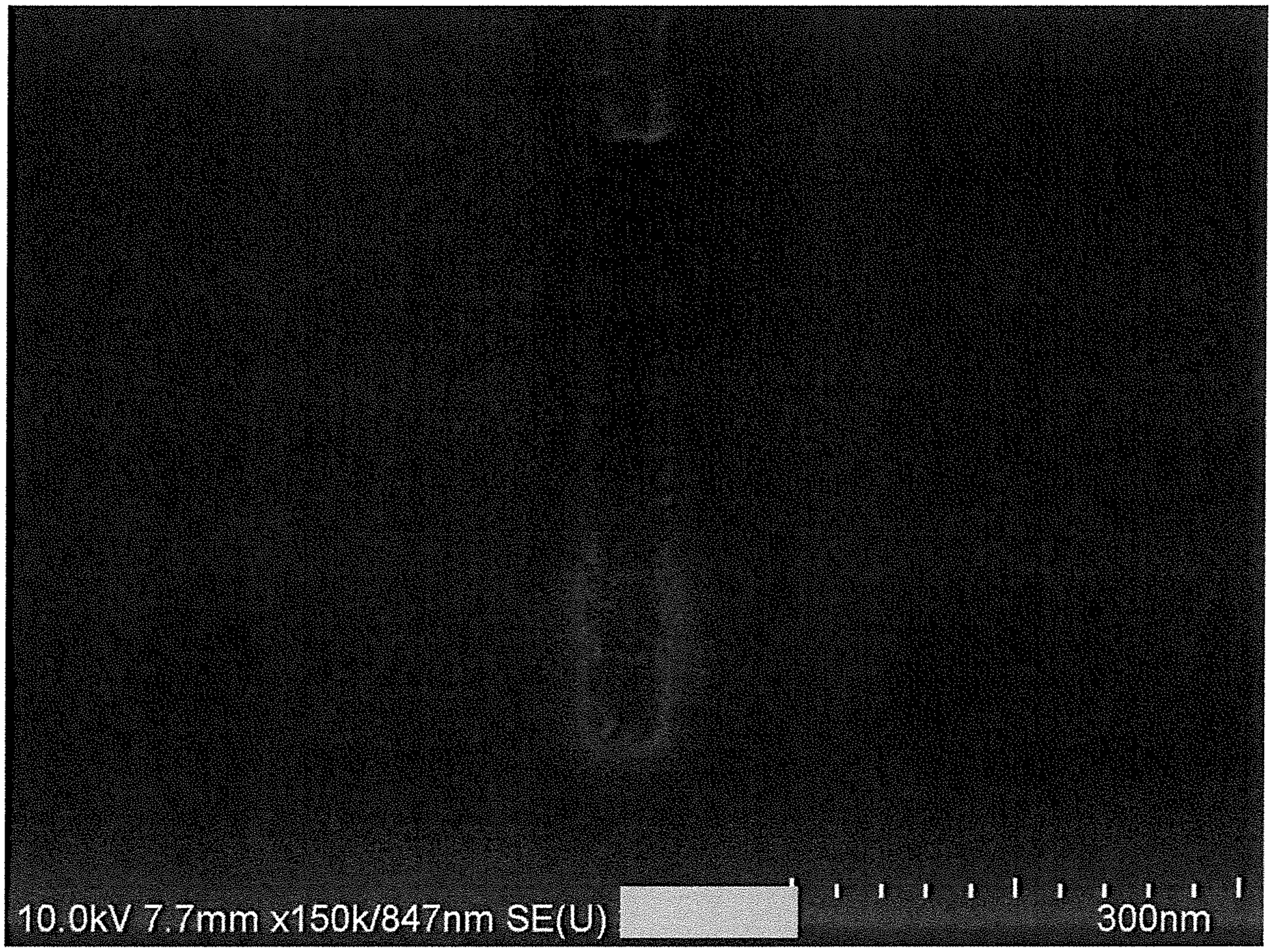


FIG. 21

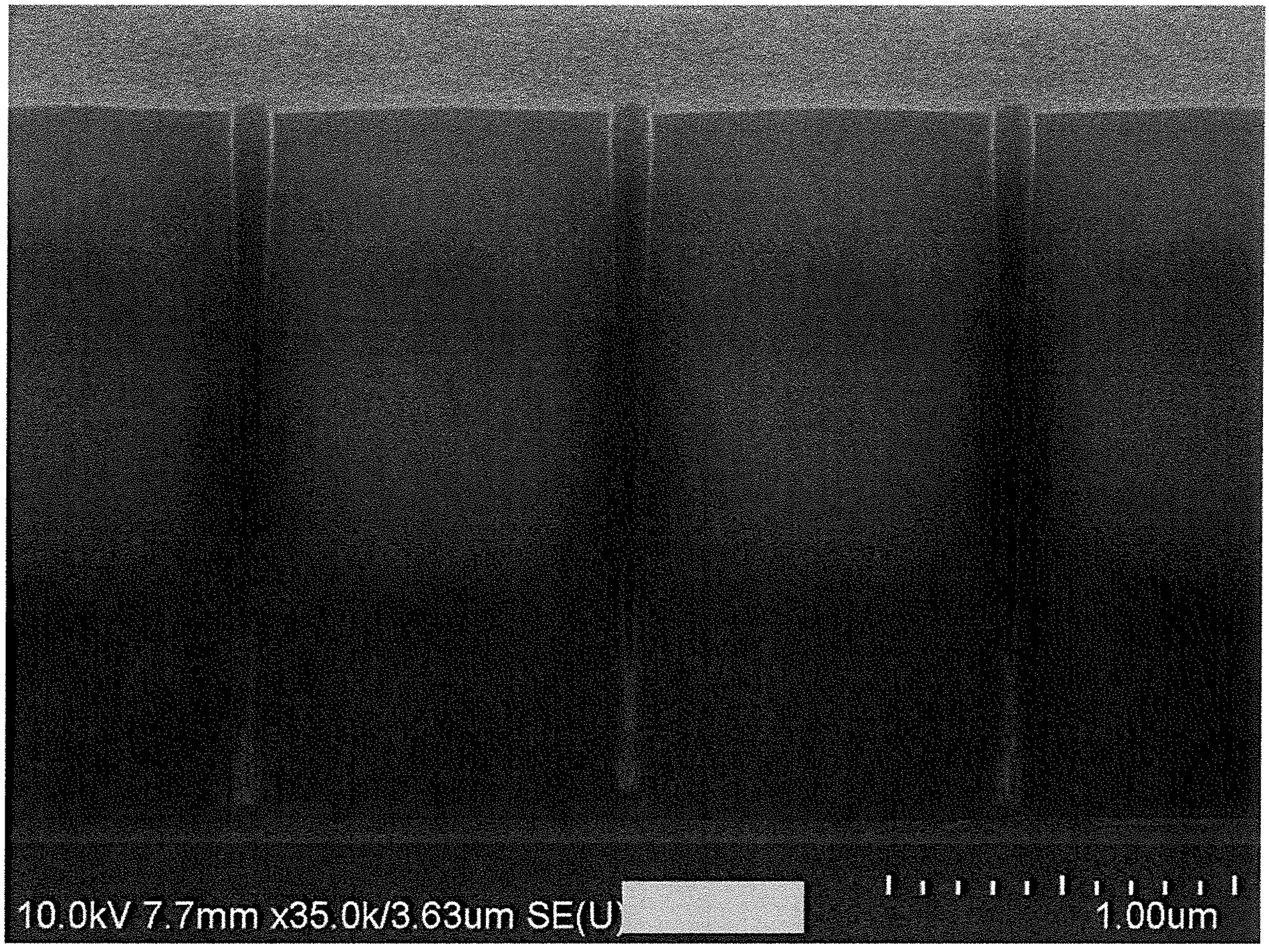
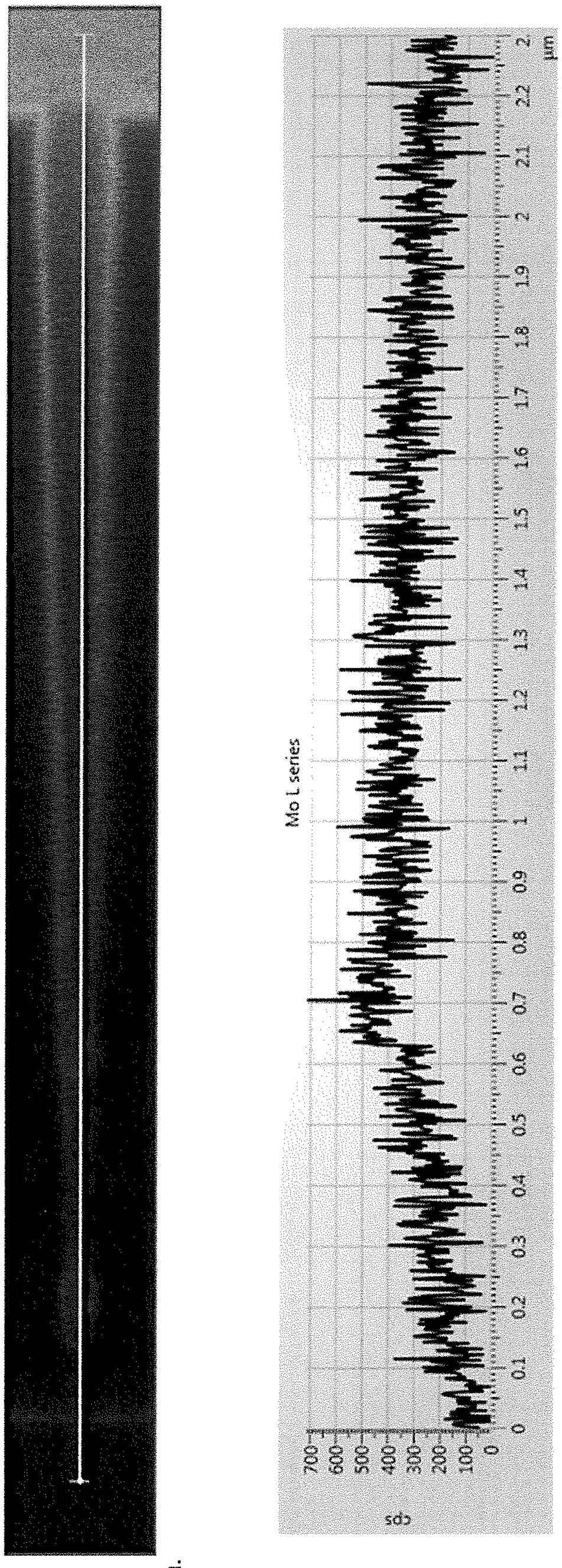
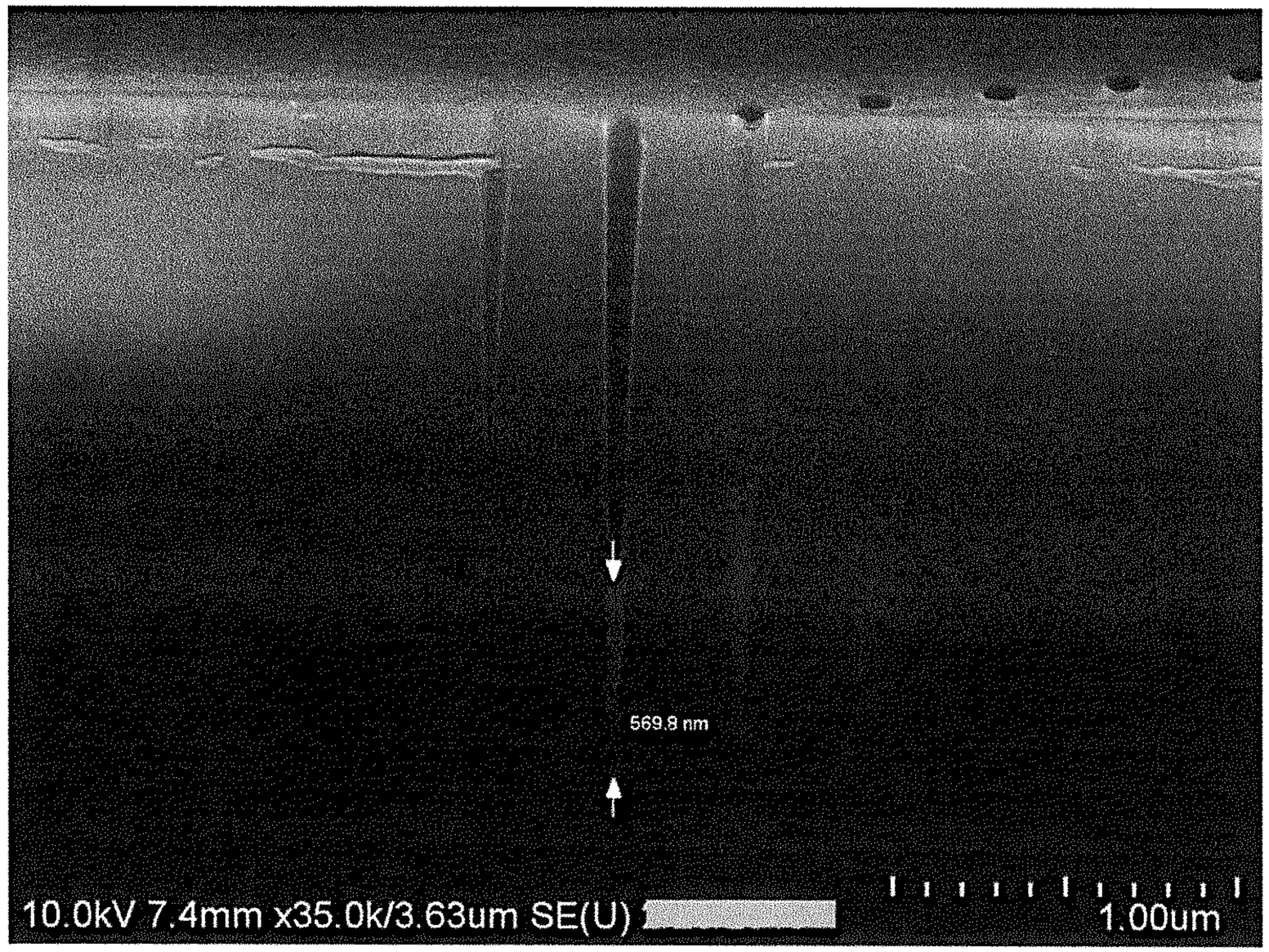


FIG. 22

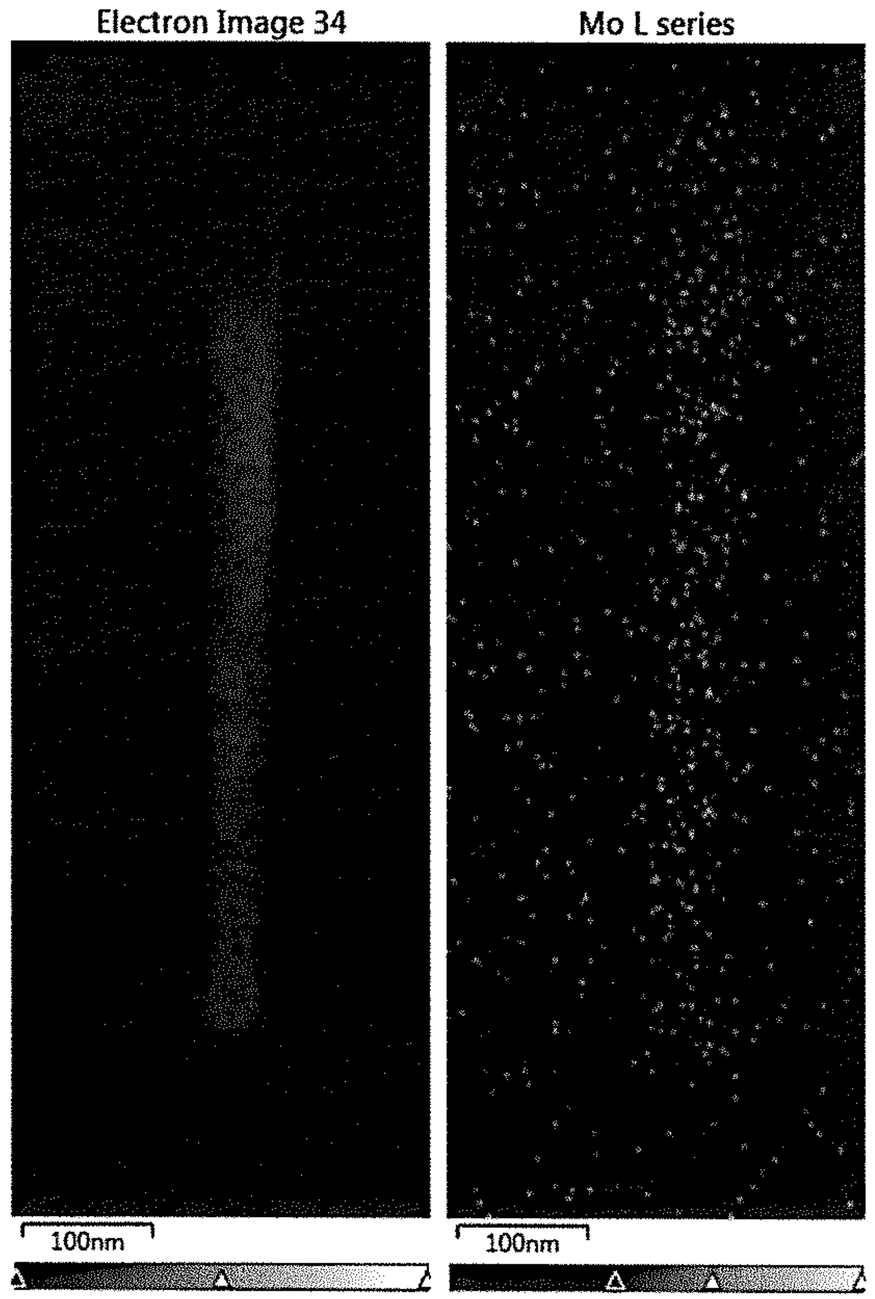

Mo L series
cps
700
600
500
400
300
200
100
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
12
13
14
15
16
17
18
19
21
22
2
µm

a. b.

FIG. 23

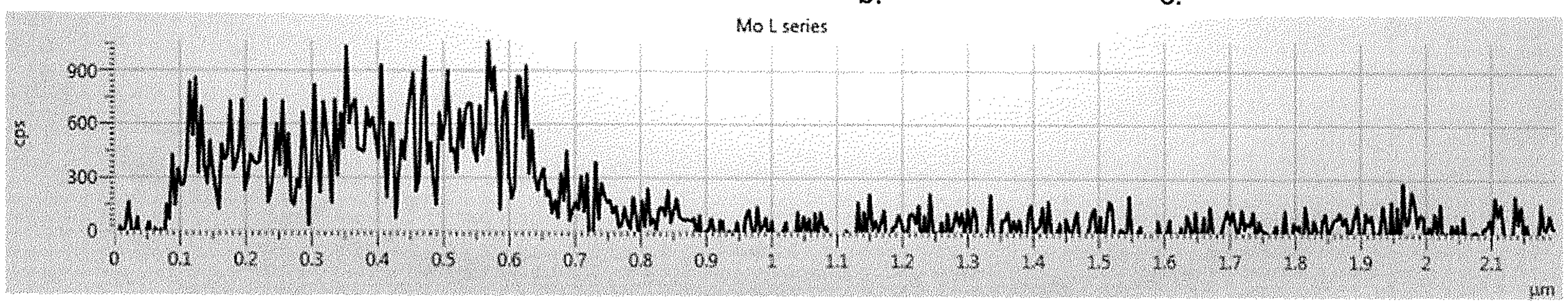


a.



b.

c.



d.

FIG. 24

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PCT/EP2018/066820

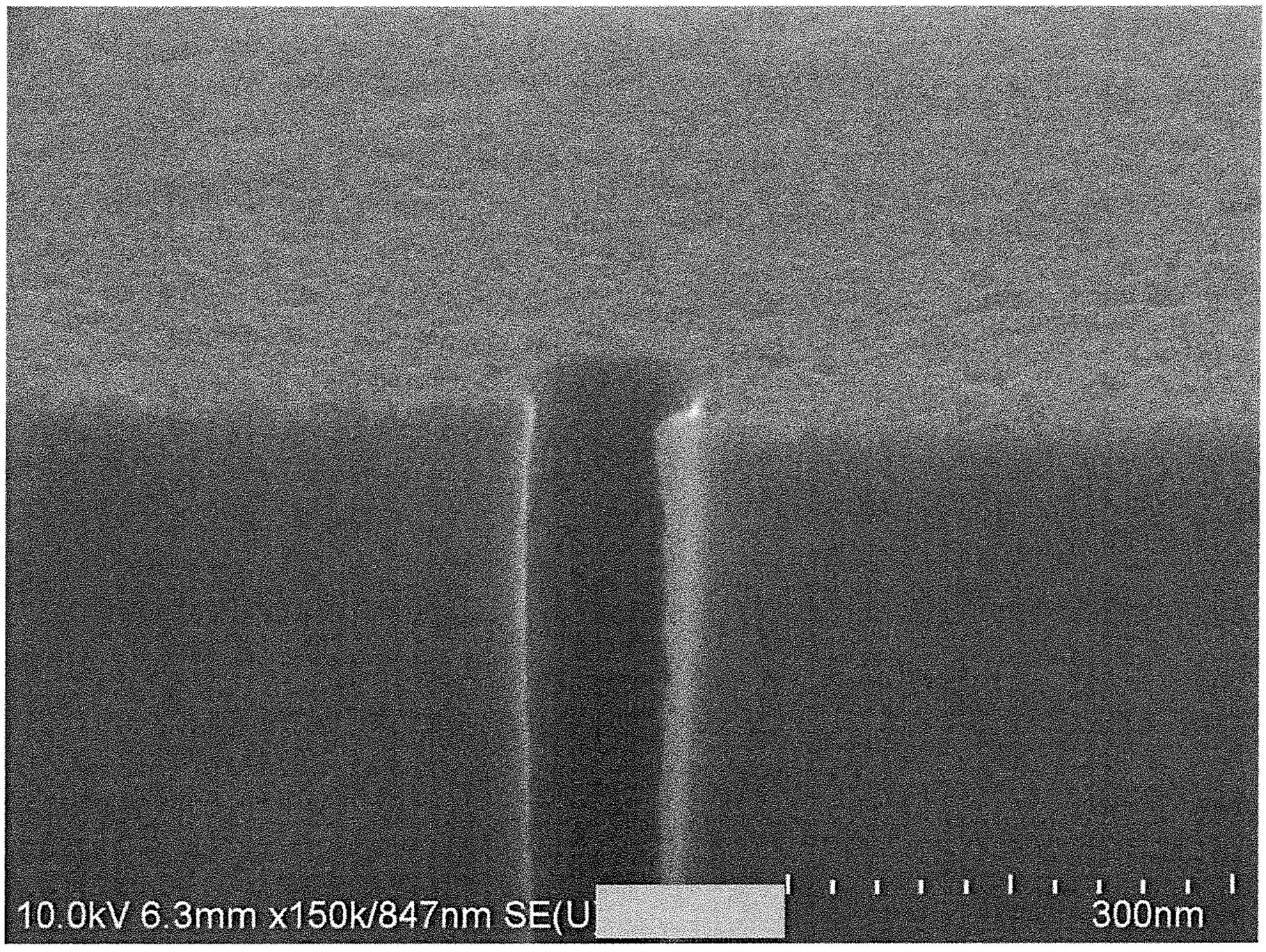


FIG. 25

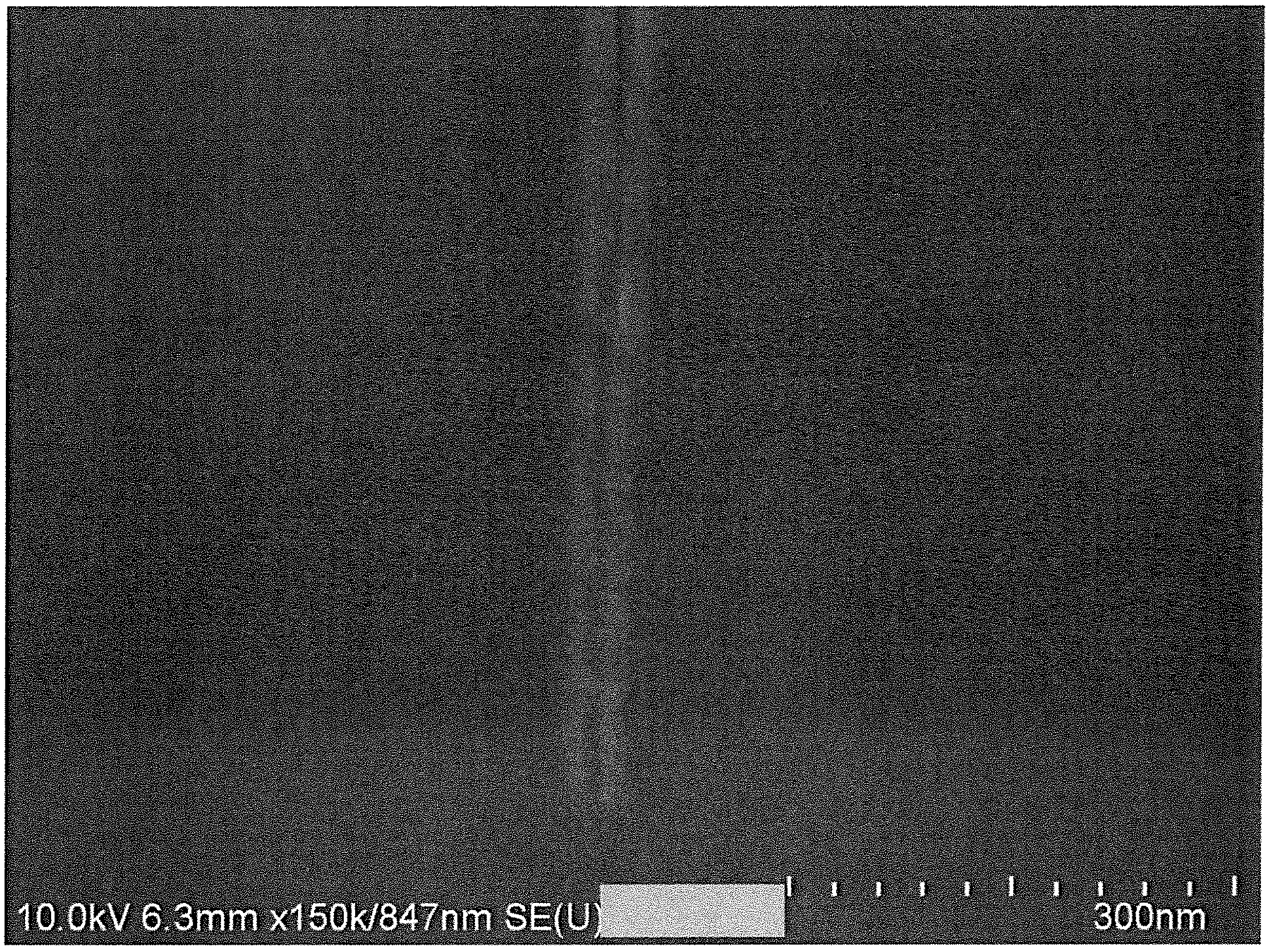


FIG. 26

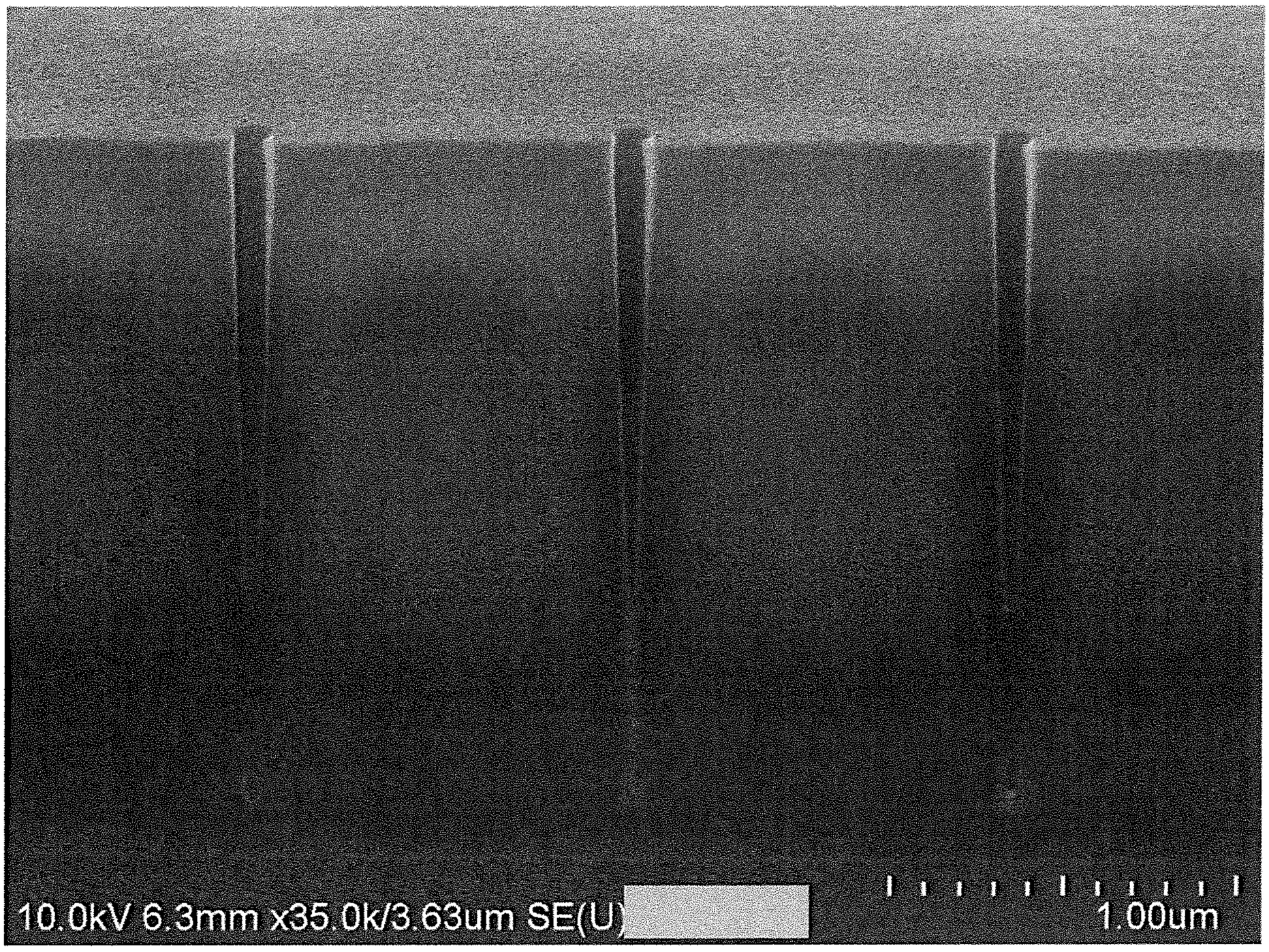


FIG. 27

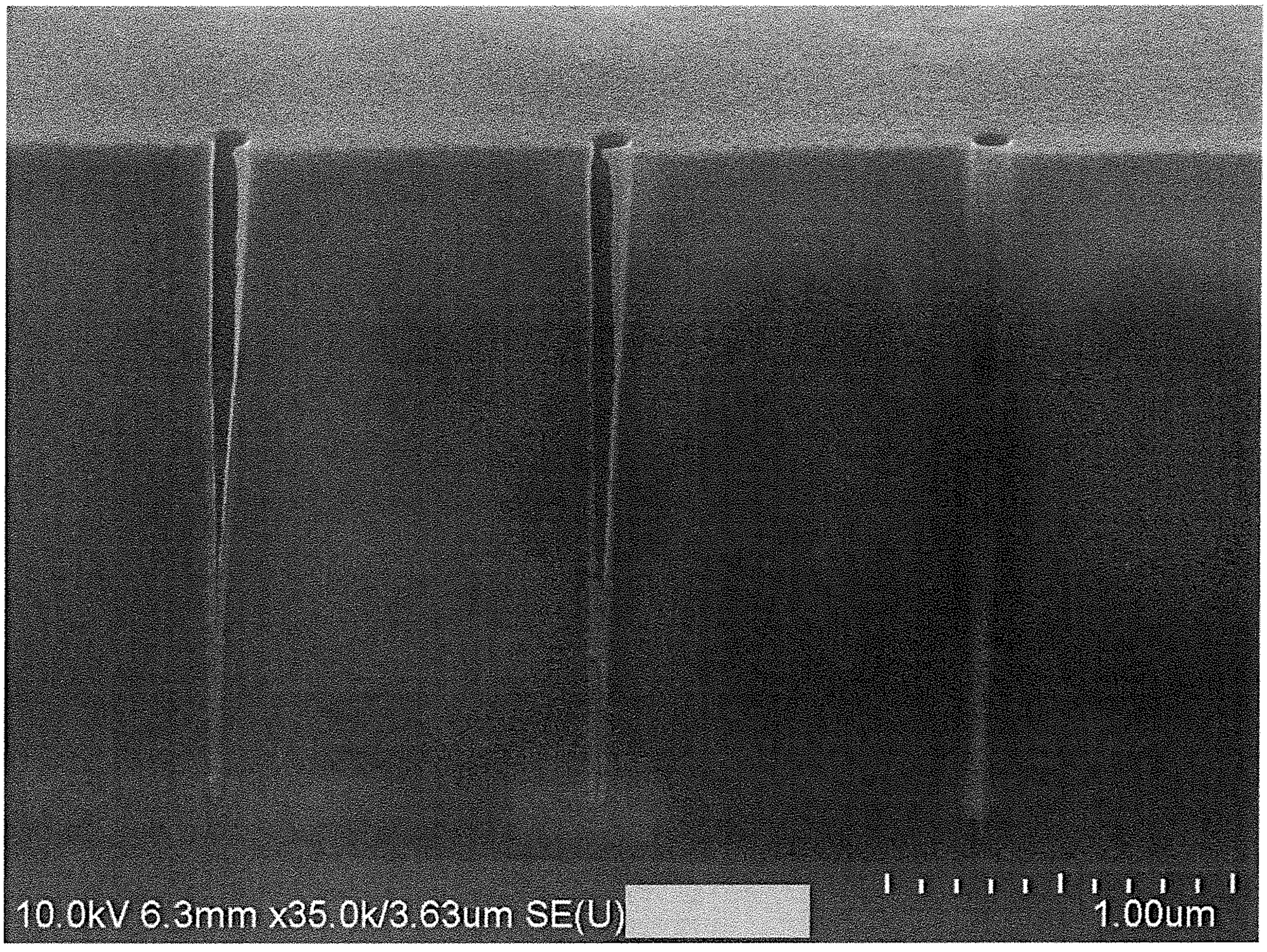
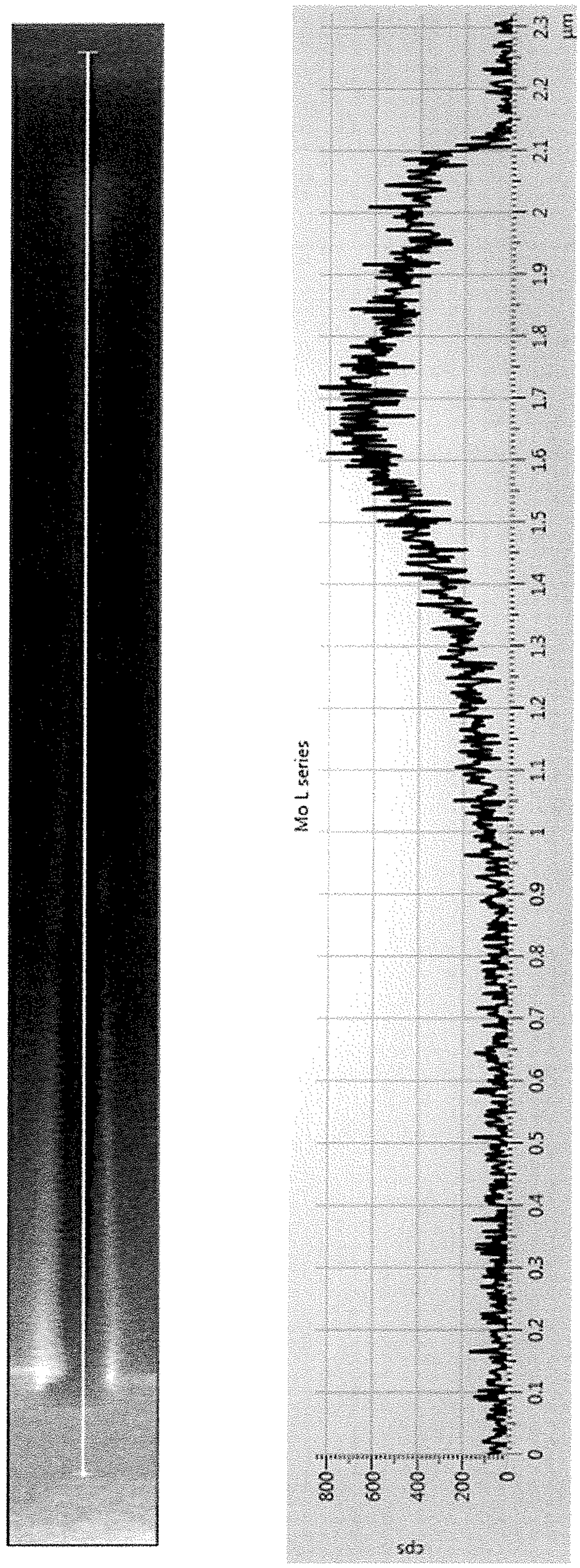


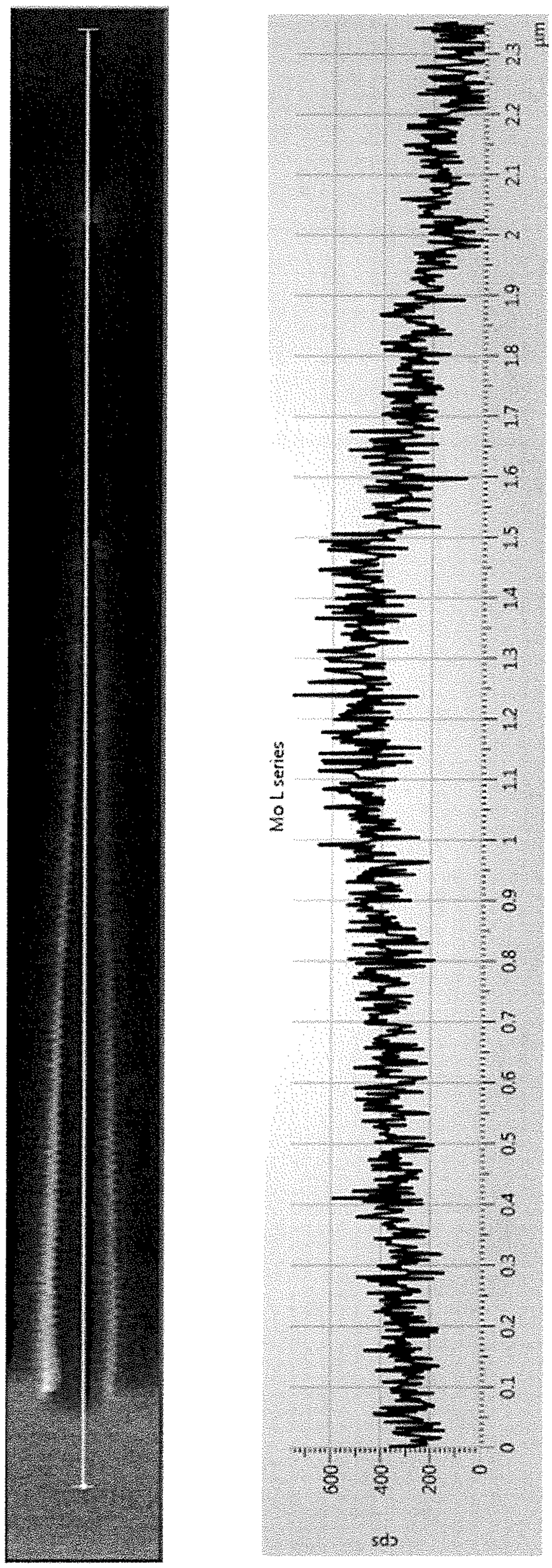
FIG. 28



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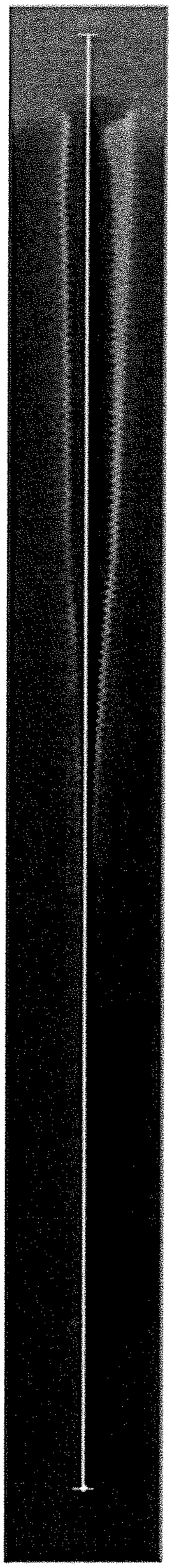
FIG. 29

a. b.

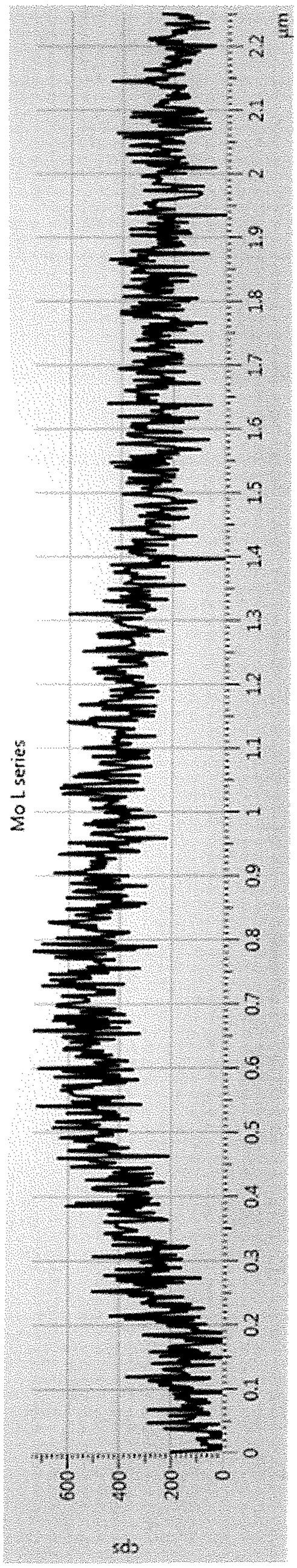

Mo L series
cps
600
400
200
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
13
14
15
16
17
18
19
2
21
2.2
2.3
μm

a. b.

FIG. 30

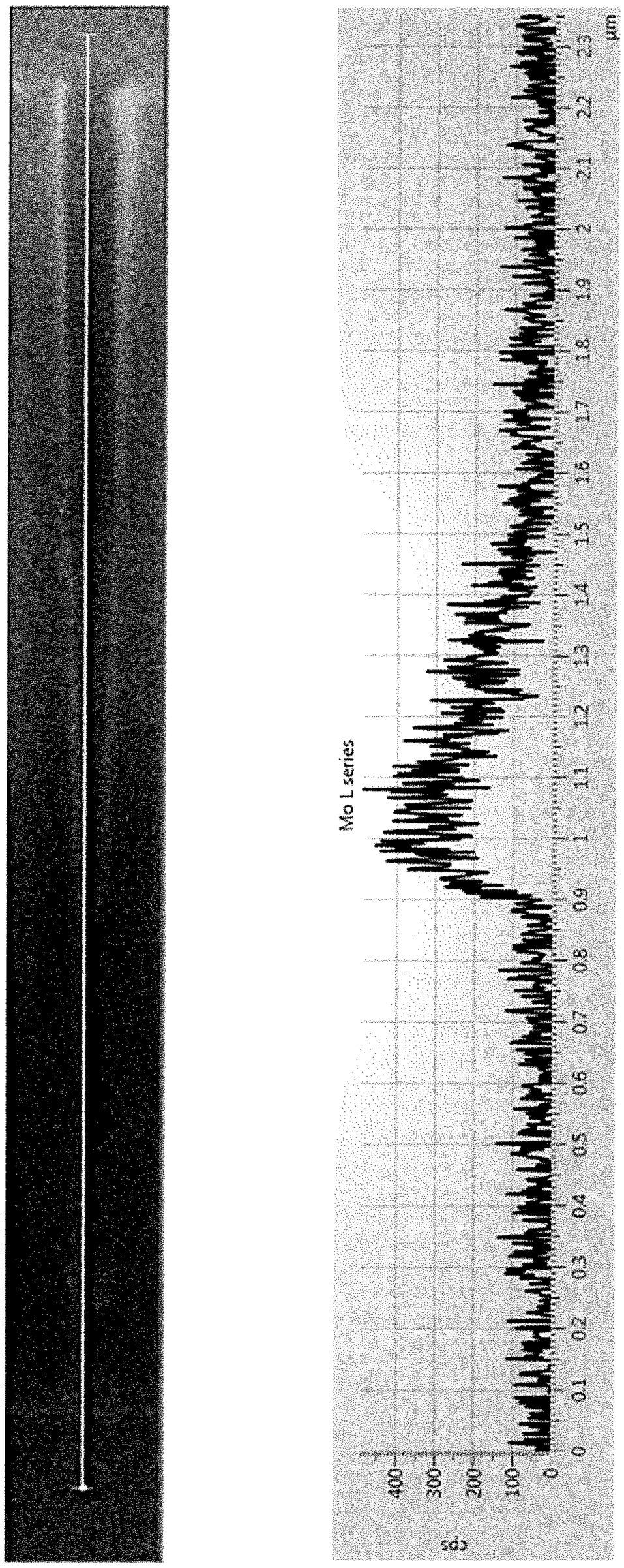


a.



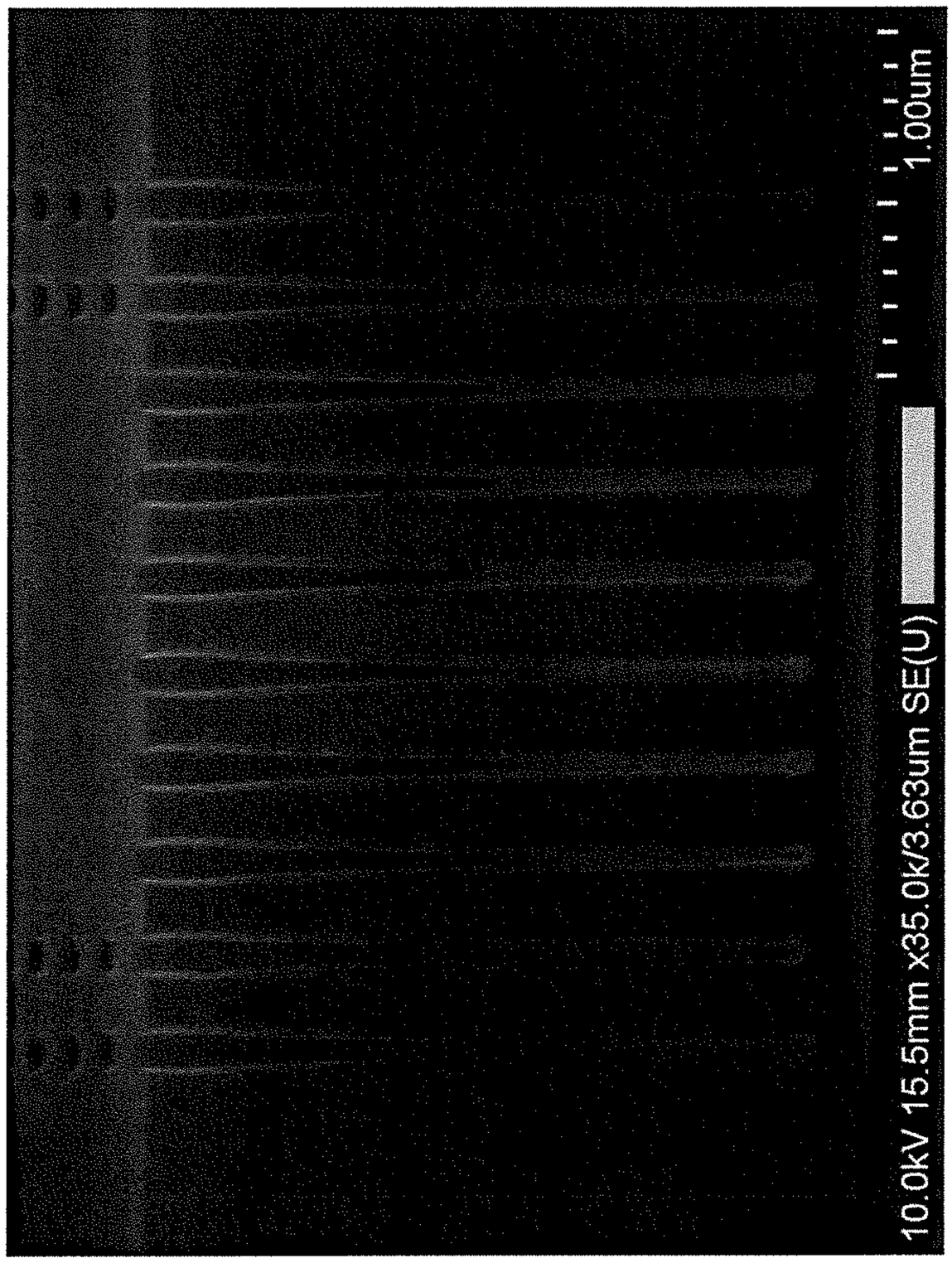
b.

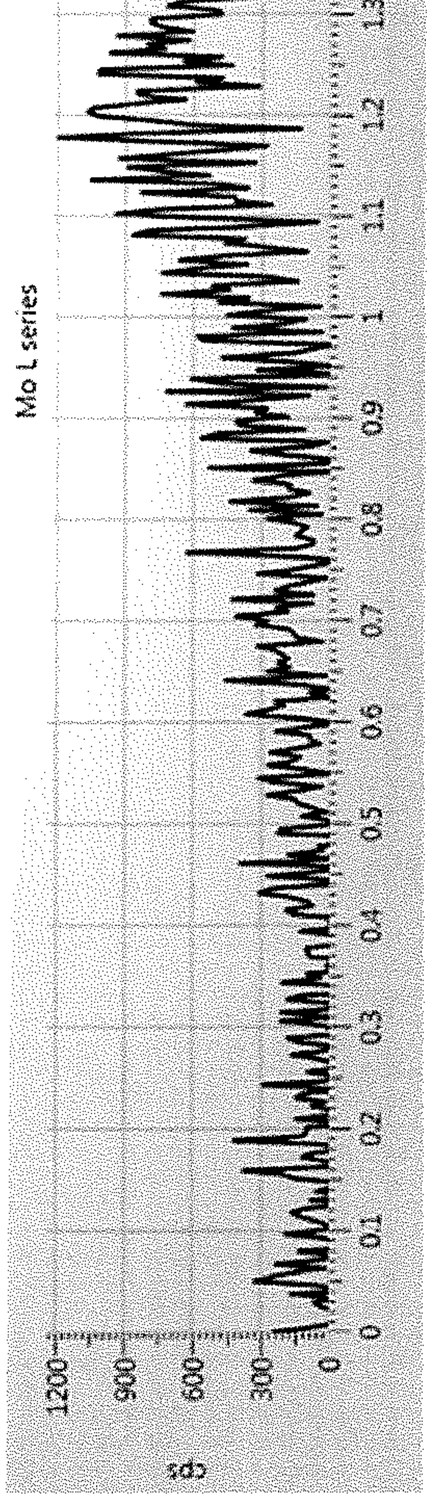
FIG. 31



a. b.

FIG. 32





a. b.

33/75

FIG. 33

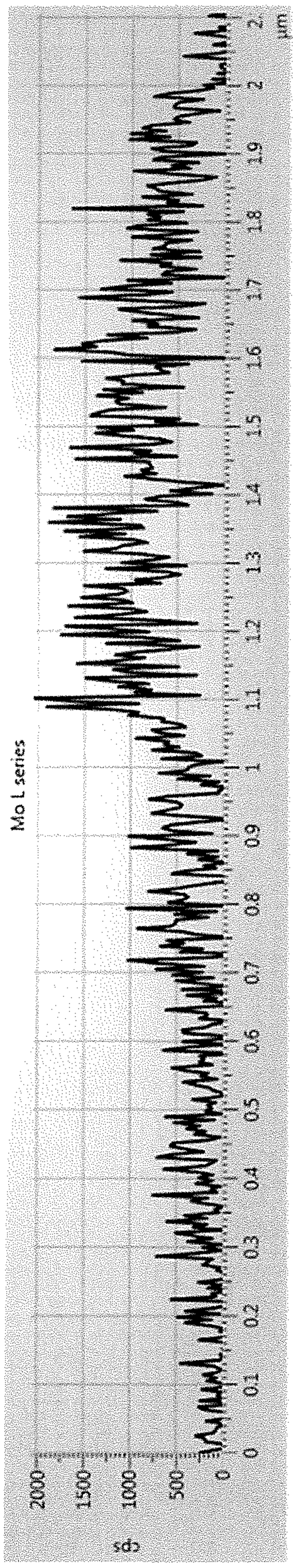


FIG. 33

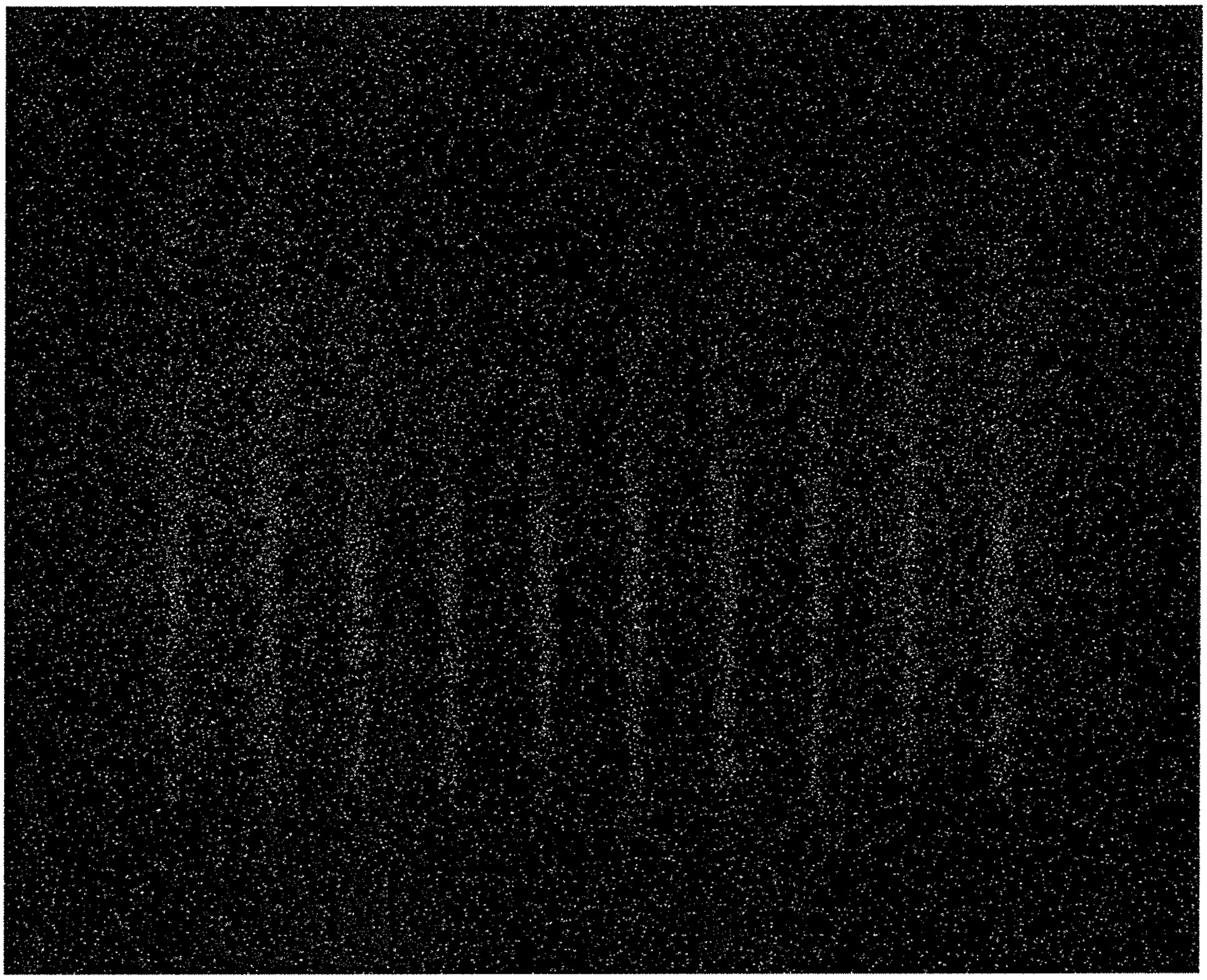


FIG. 34

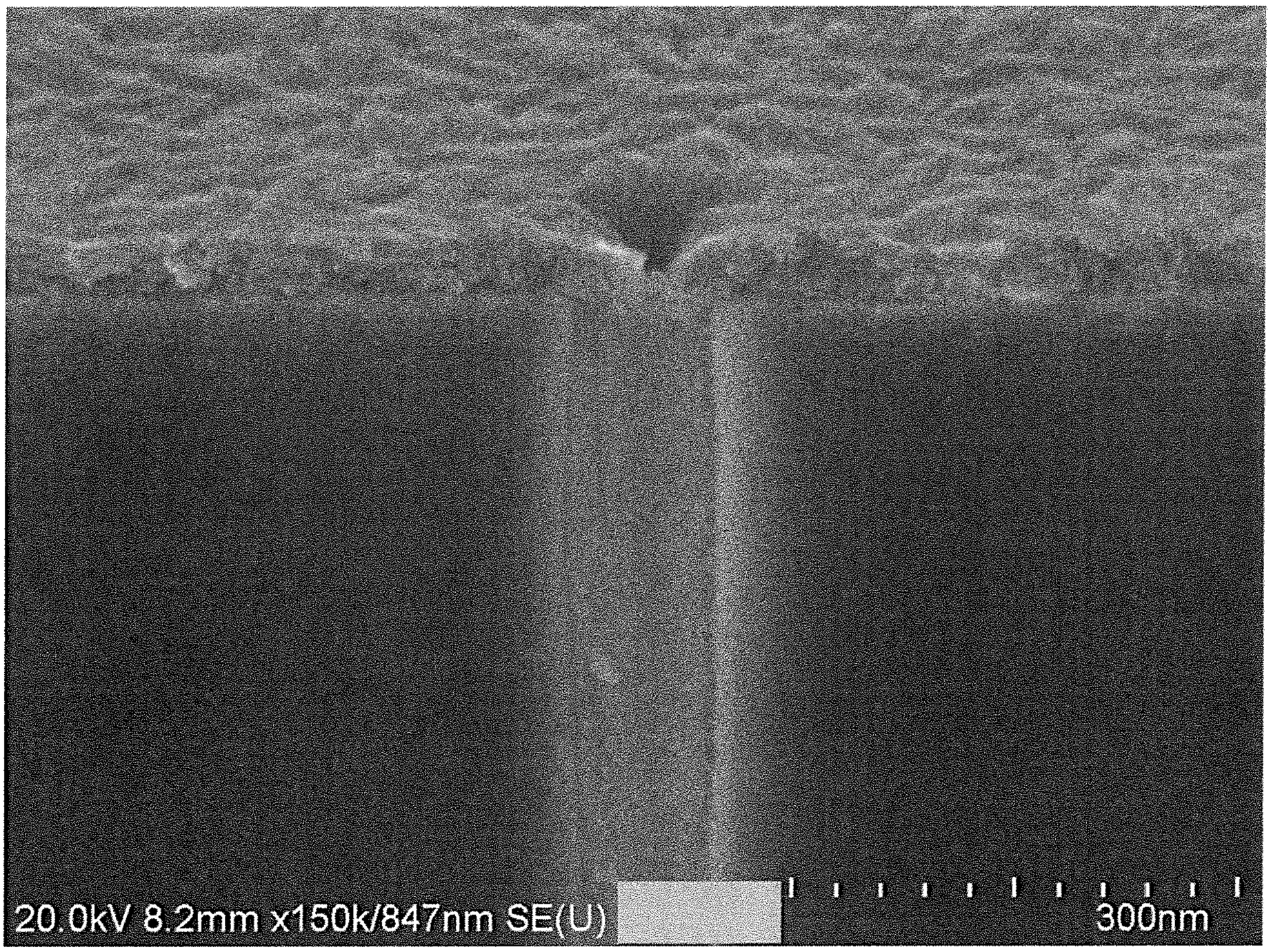


FIG. 35

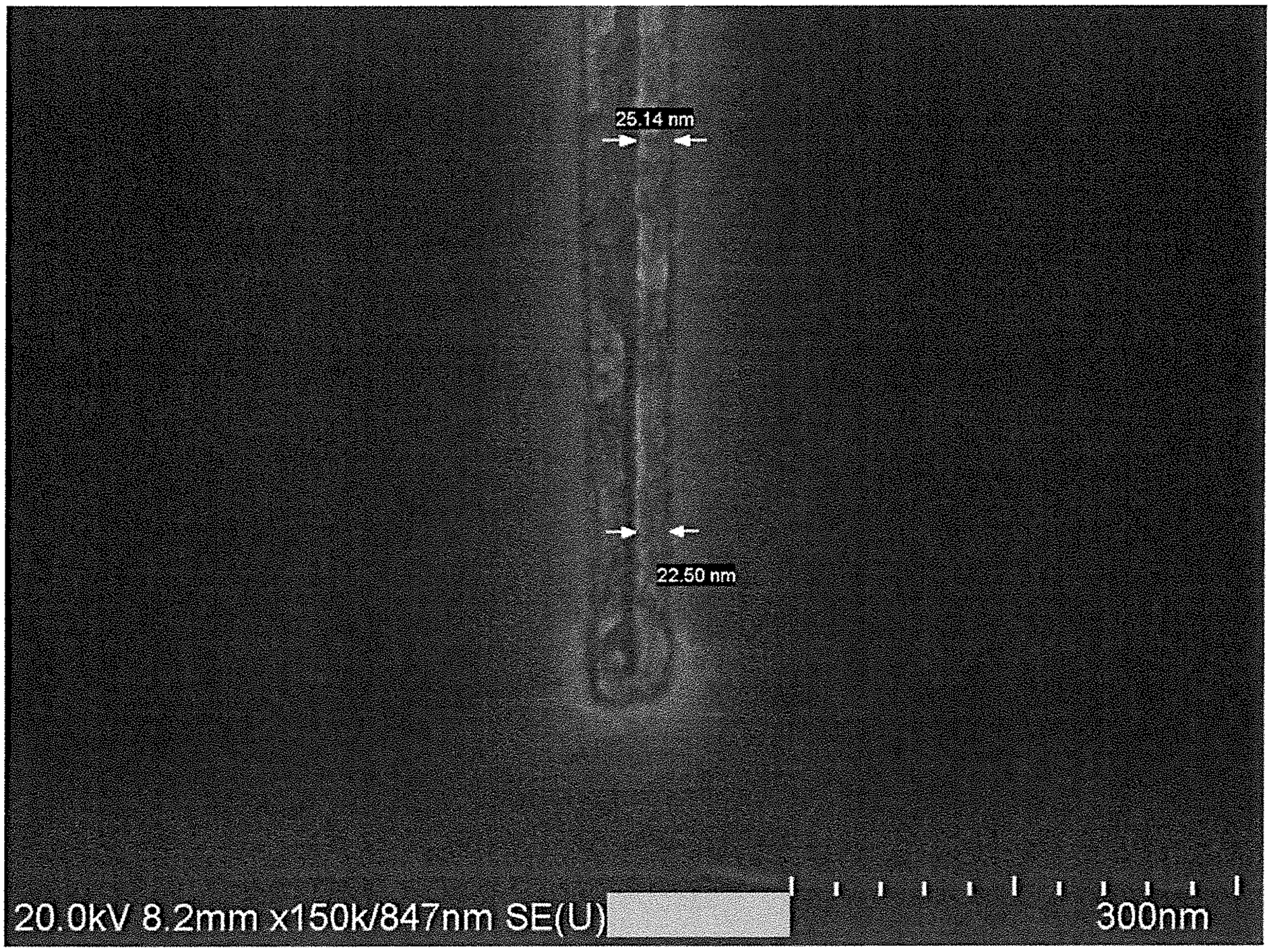


FIG. 36

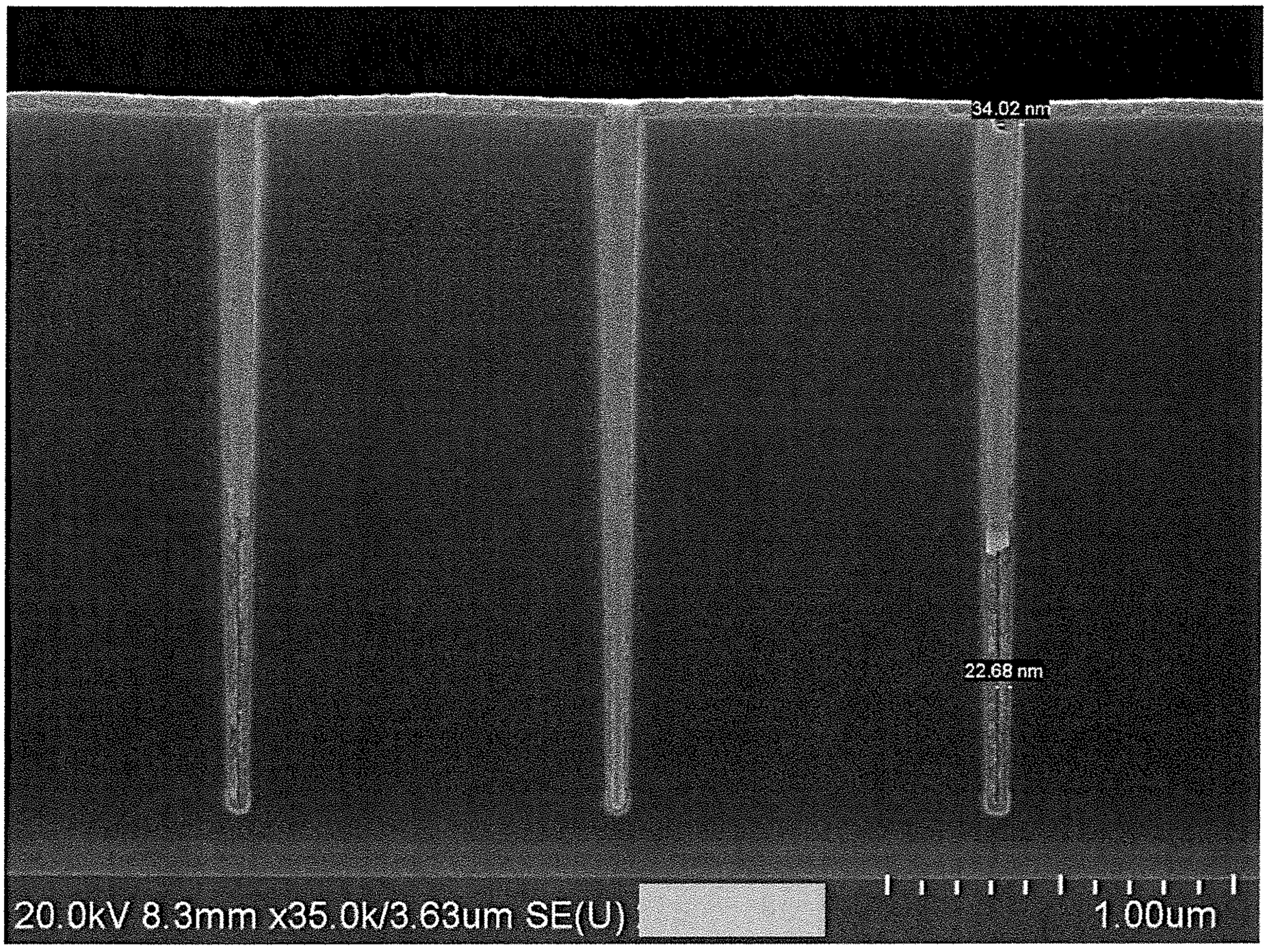


FIG. 37

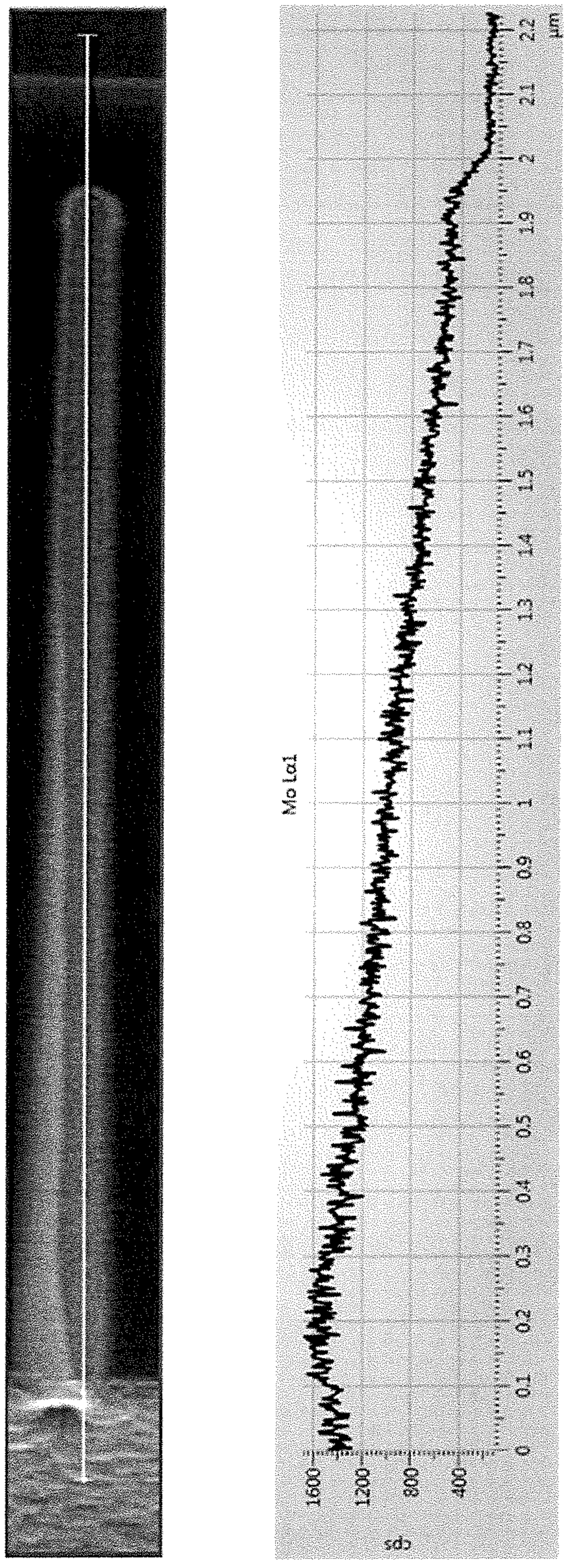

Mo La1
cps
1600
1200
800
400
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
12
13
14
15
16
17
18
1.9
2
2.1
2.2
µm
a.
b.

FIG. 38

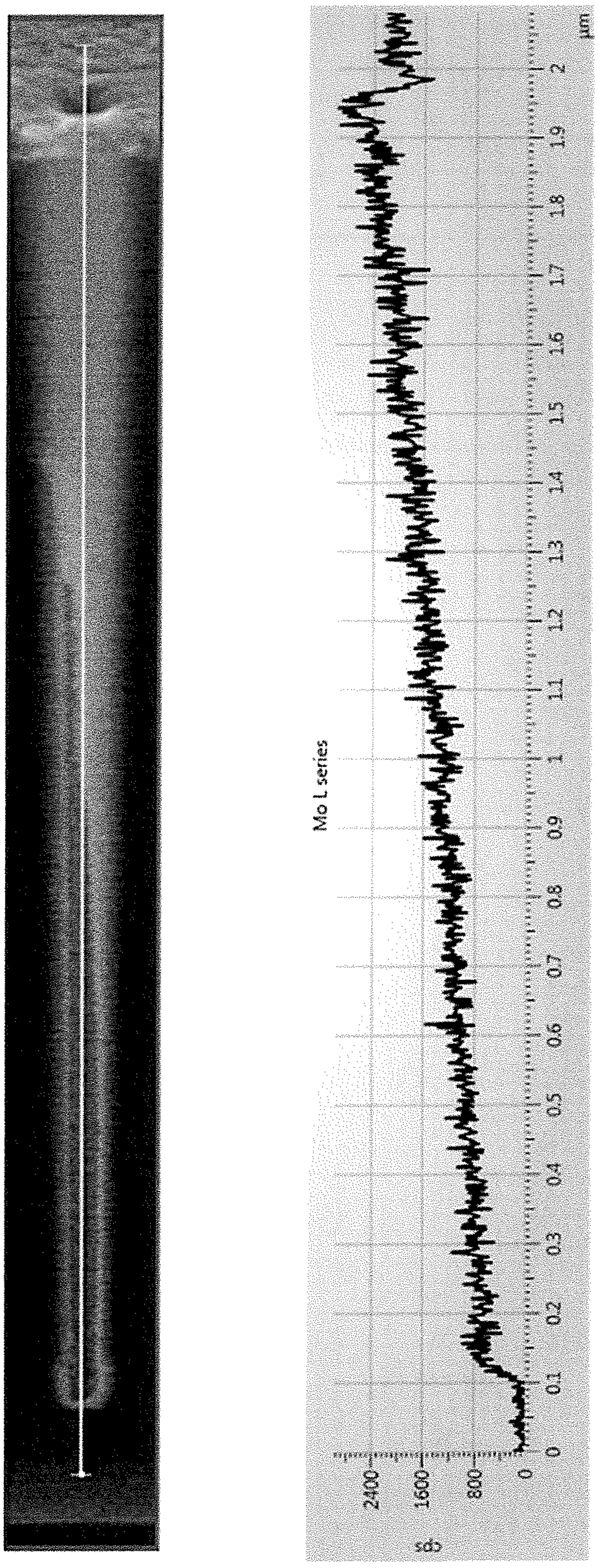

Mo L series
2400
1600
800
0
cps
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
µm
a.
b.

FIG. 39

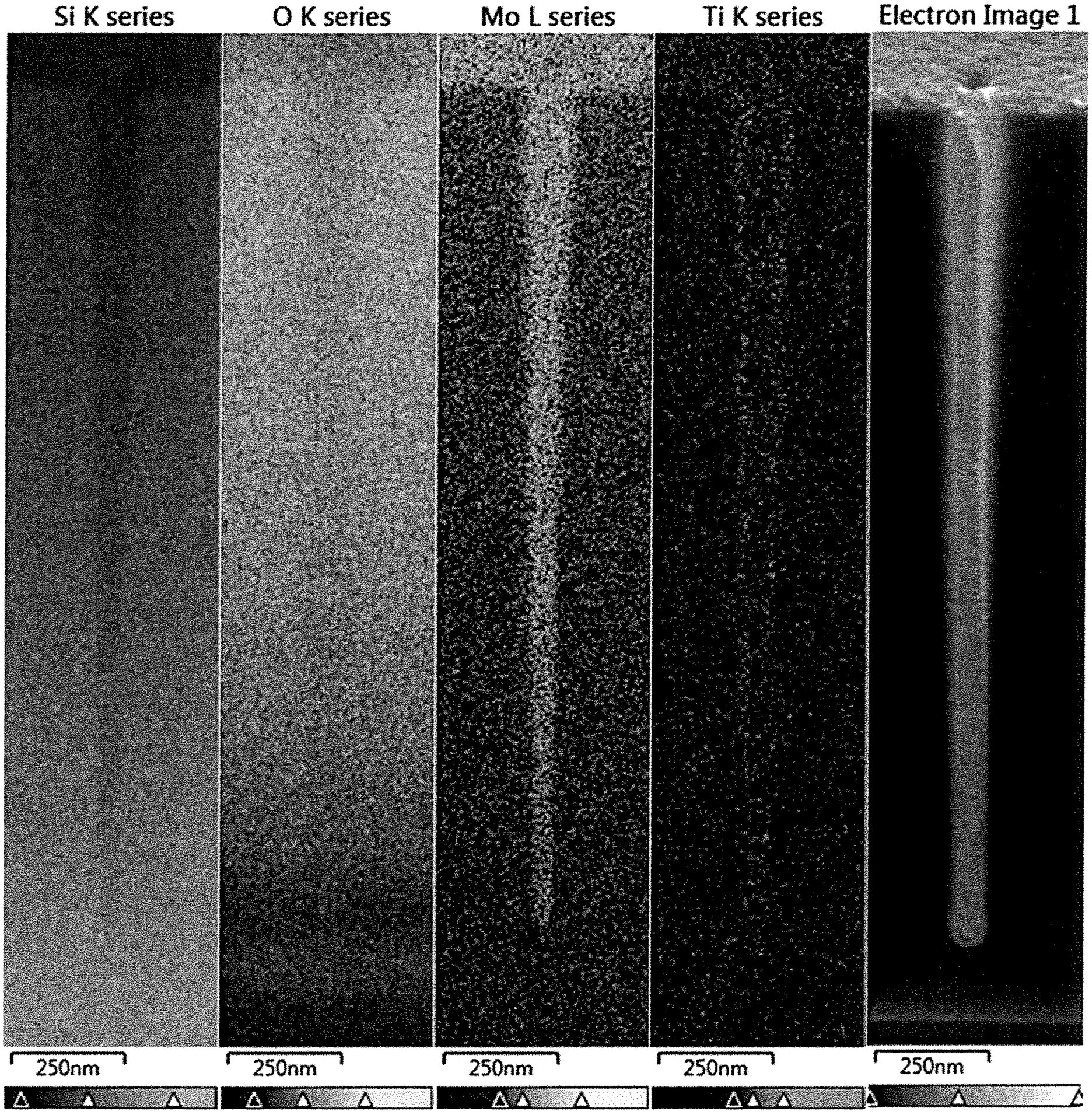

Si K series
O K series
Mo L series
Ti K series
Electron Image 1
250nm
250nm
250nm
250nm
250nm

FIG. 40

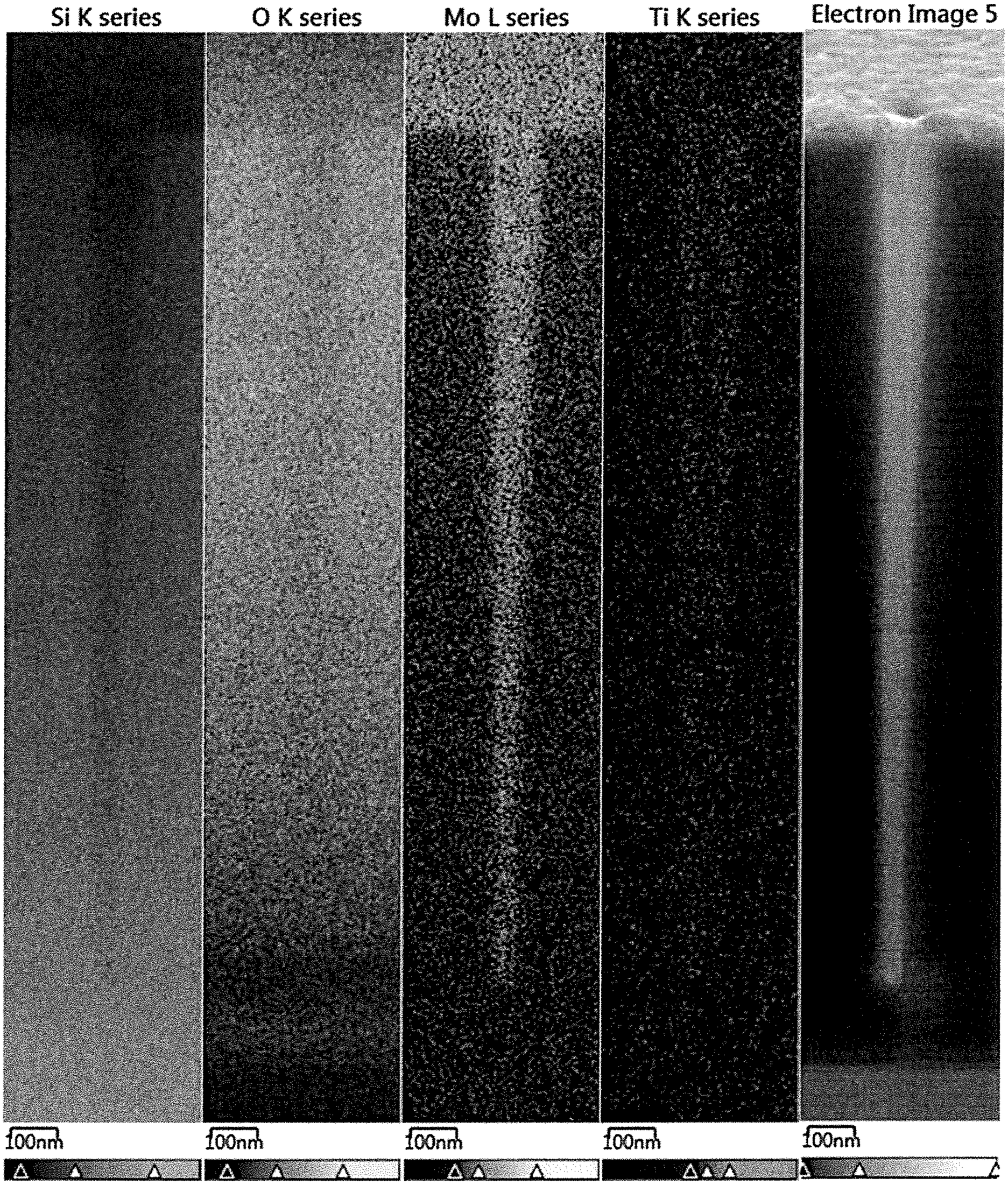
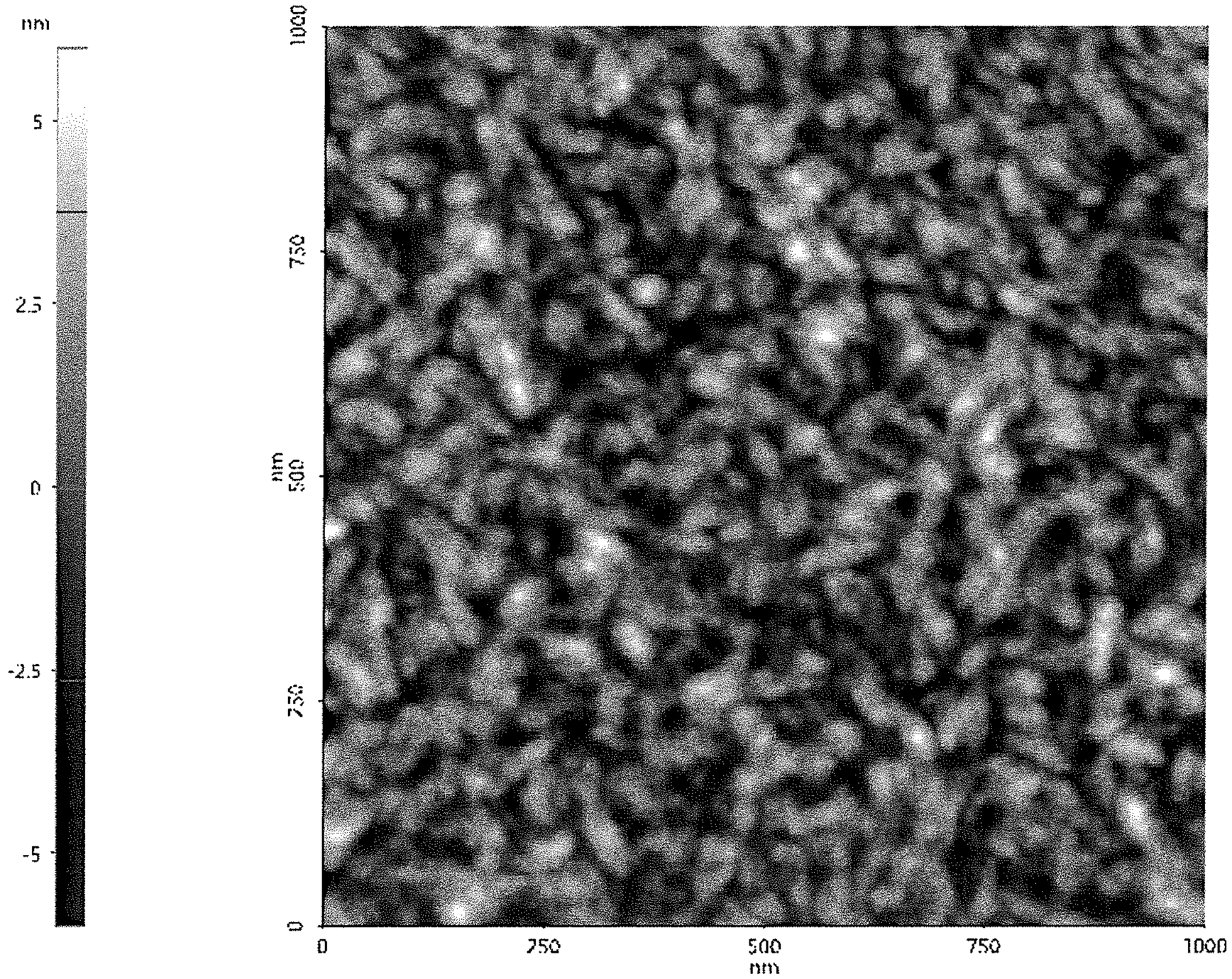
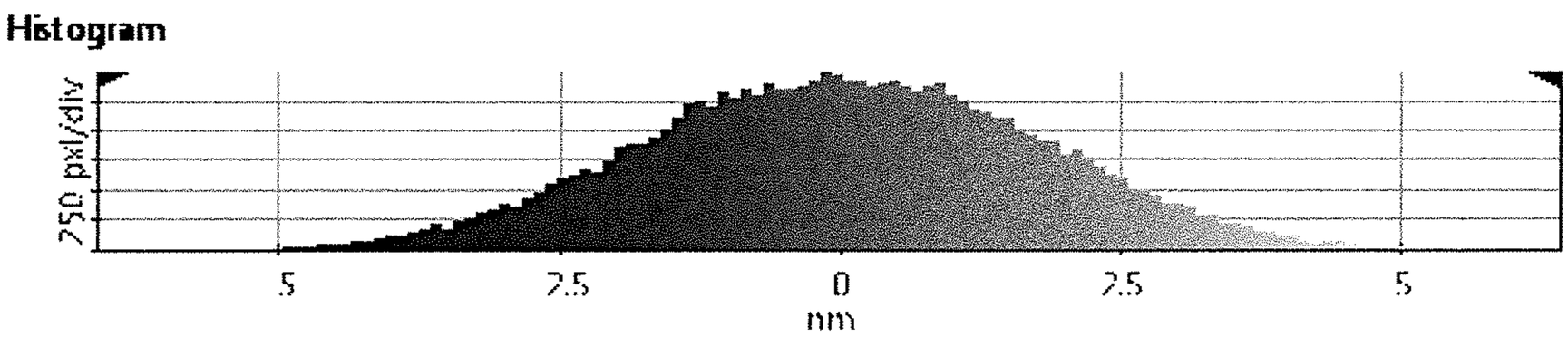

Si K series
O K series
Mo L series
Ti K series
Electron Image 5
100nm
100nm
100nm
100nm
100nm

FIG. 41


nm
5
2.5
0
-2.5
-5
1000
750
500
250
0
nm
0
250
500
750
1000
nm

a.


Histogram
250 pxl/div
5
2.5
0
2.5
5
nm

b.

FIG. 42

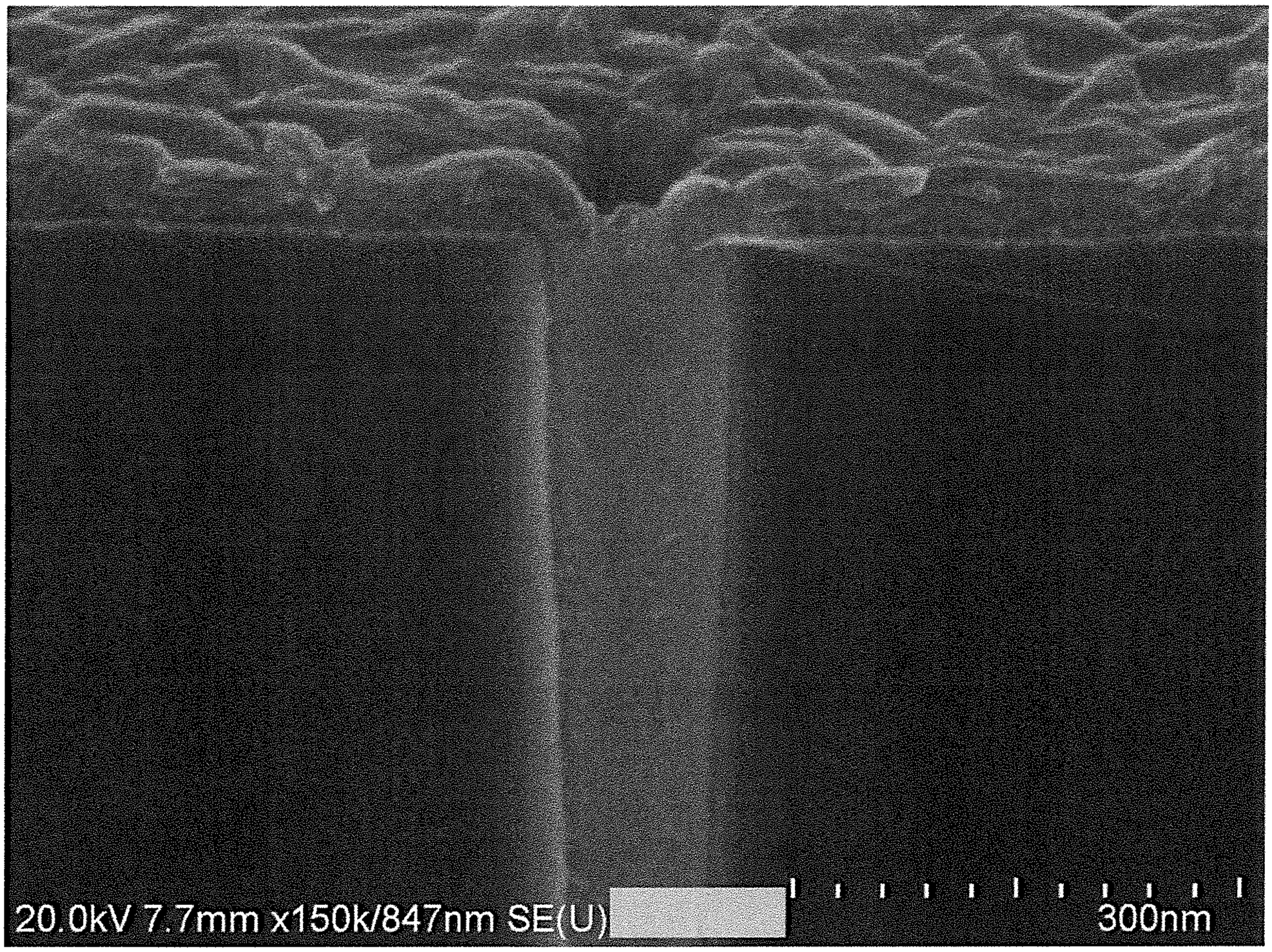


FIG. 43

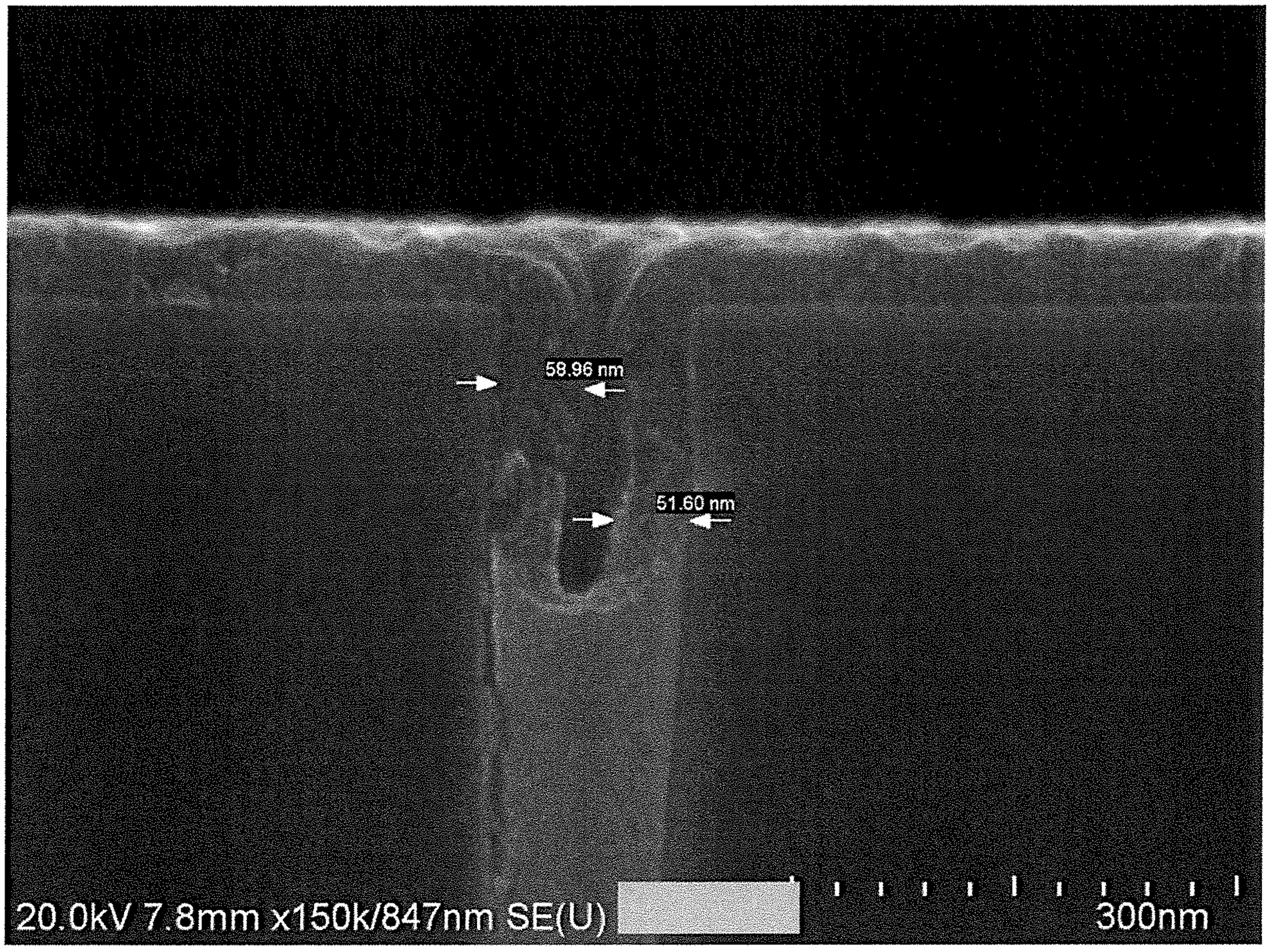


FIG. 44

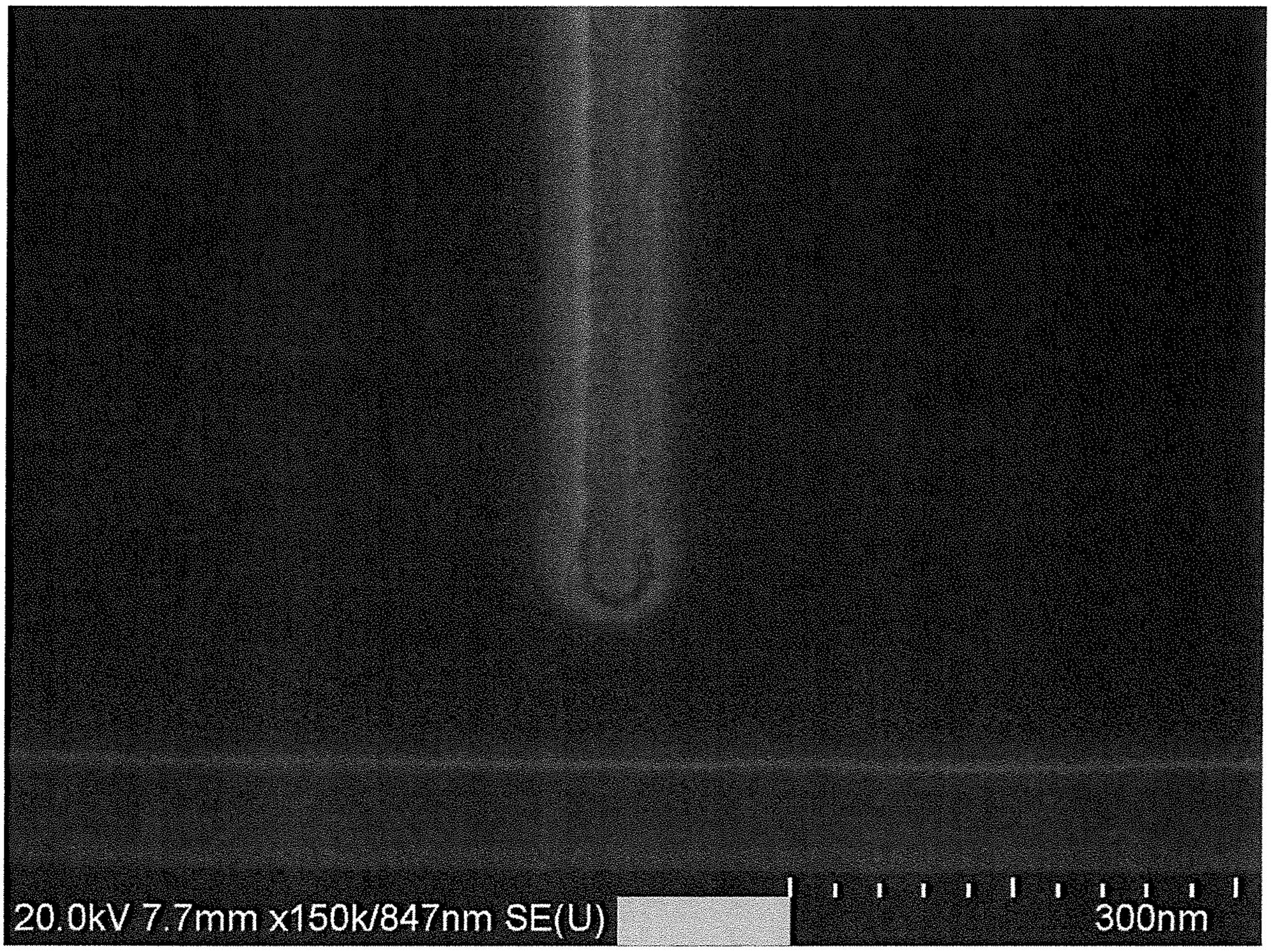


FIG. 45

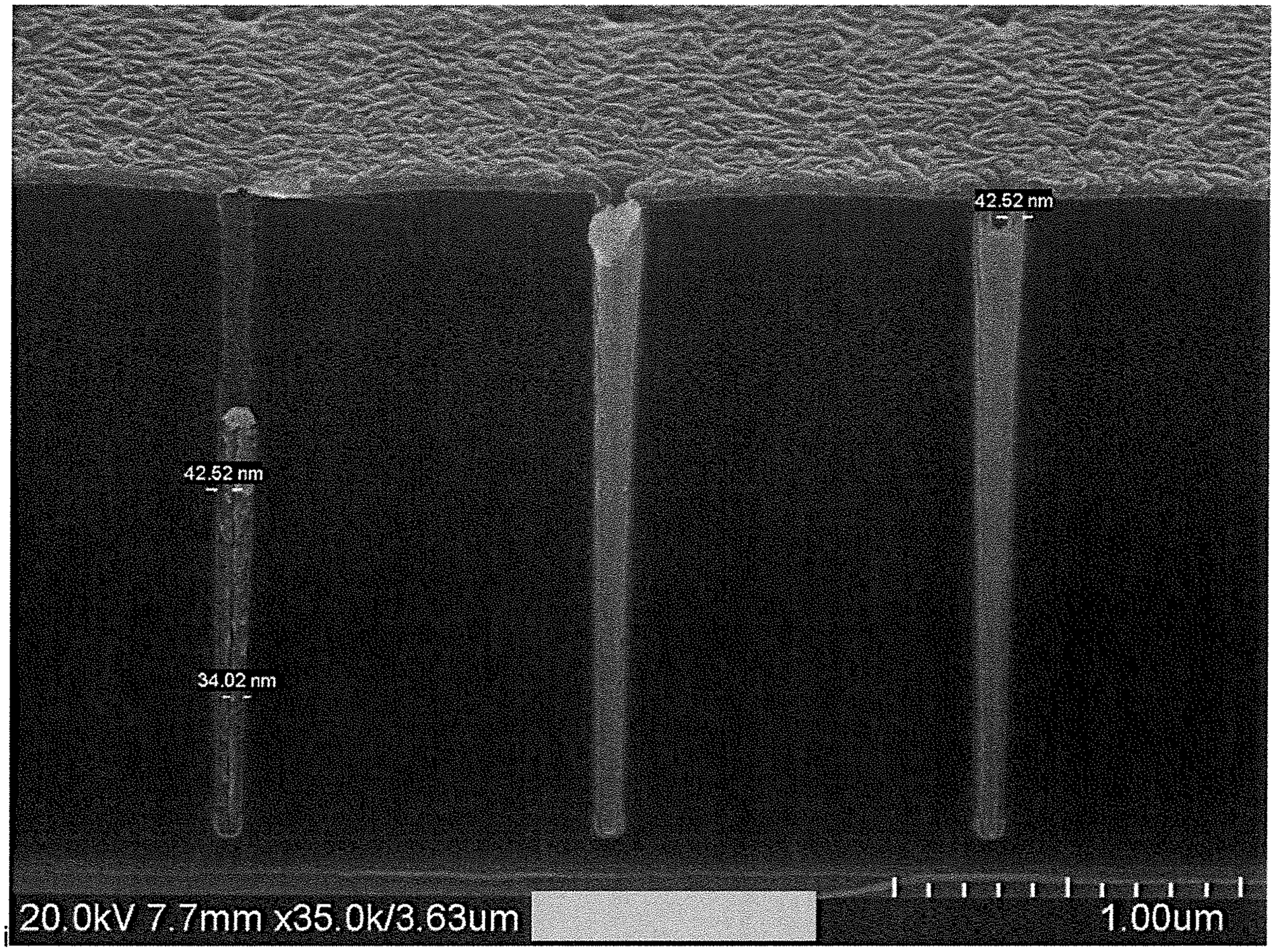
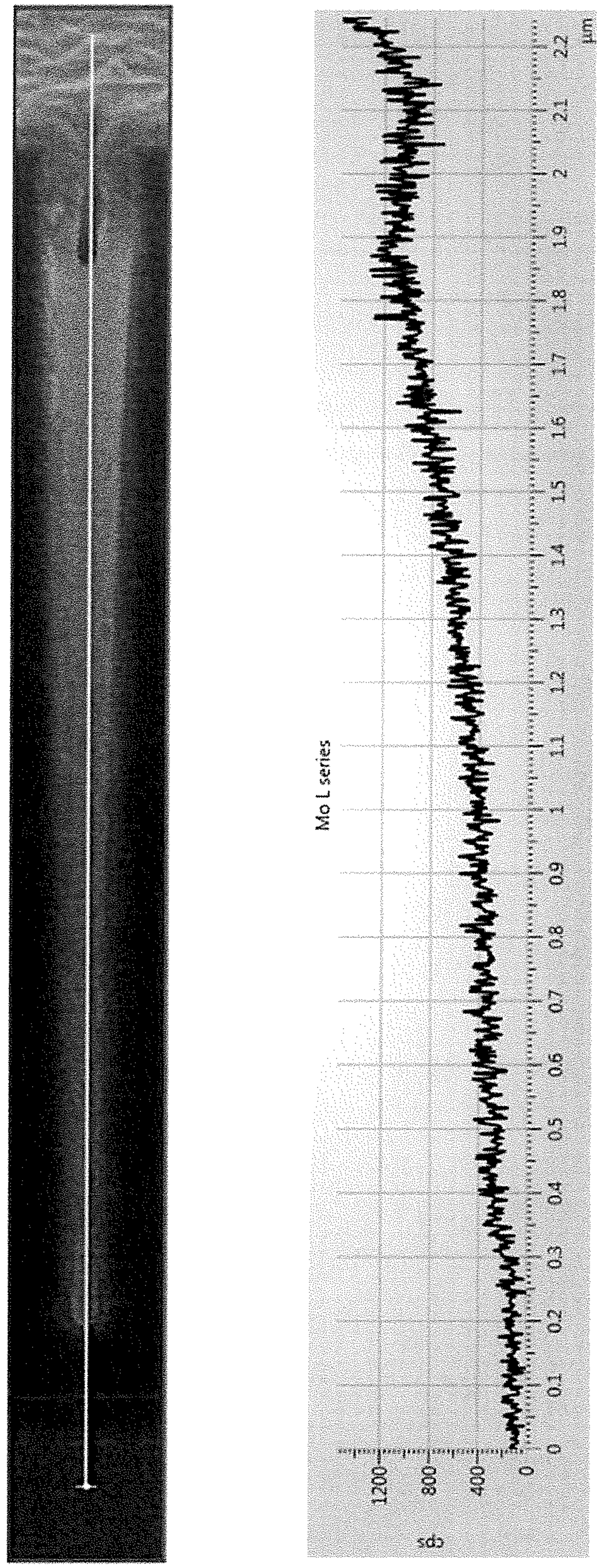


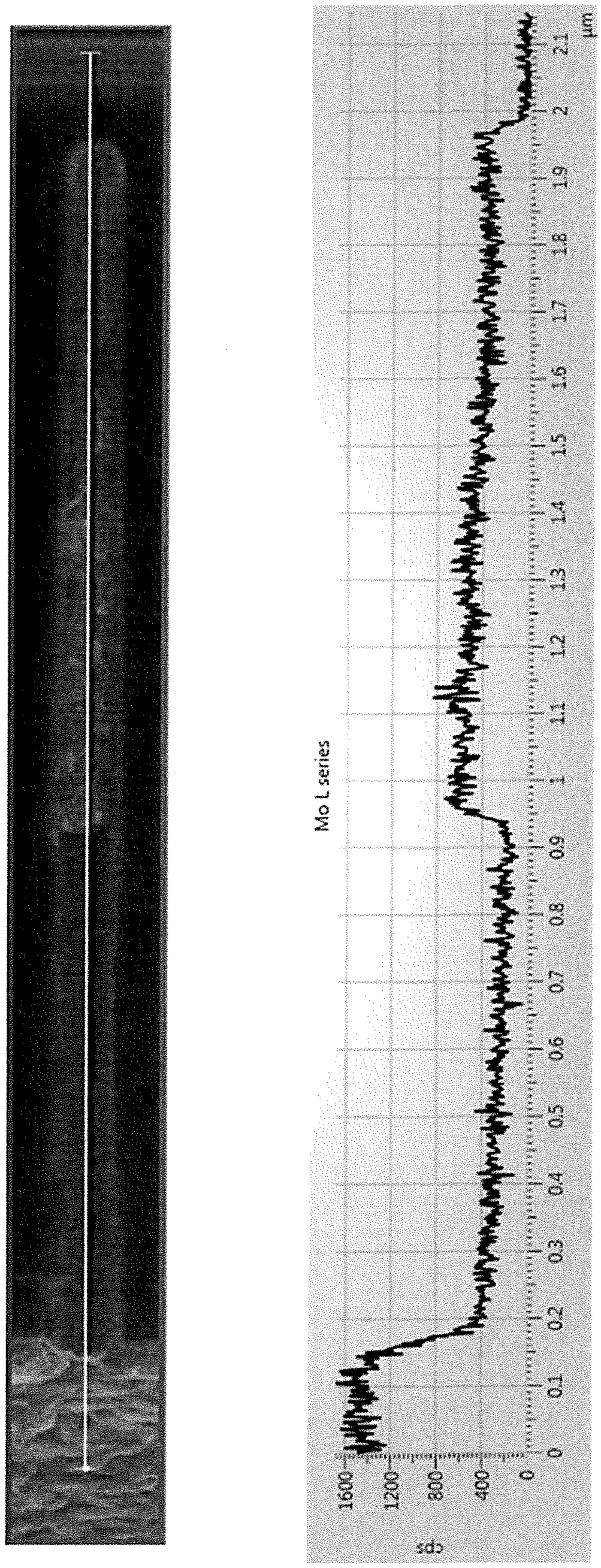
FIG. 46



48/75

FIG. 47

a. b.


Mo L series
cps
1600
1200
800
400
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
11
12
13
14
15
16
17
18
19
2
21
µm

a. b.

FIG. 48

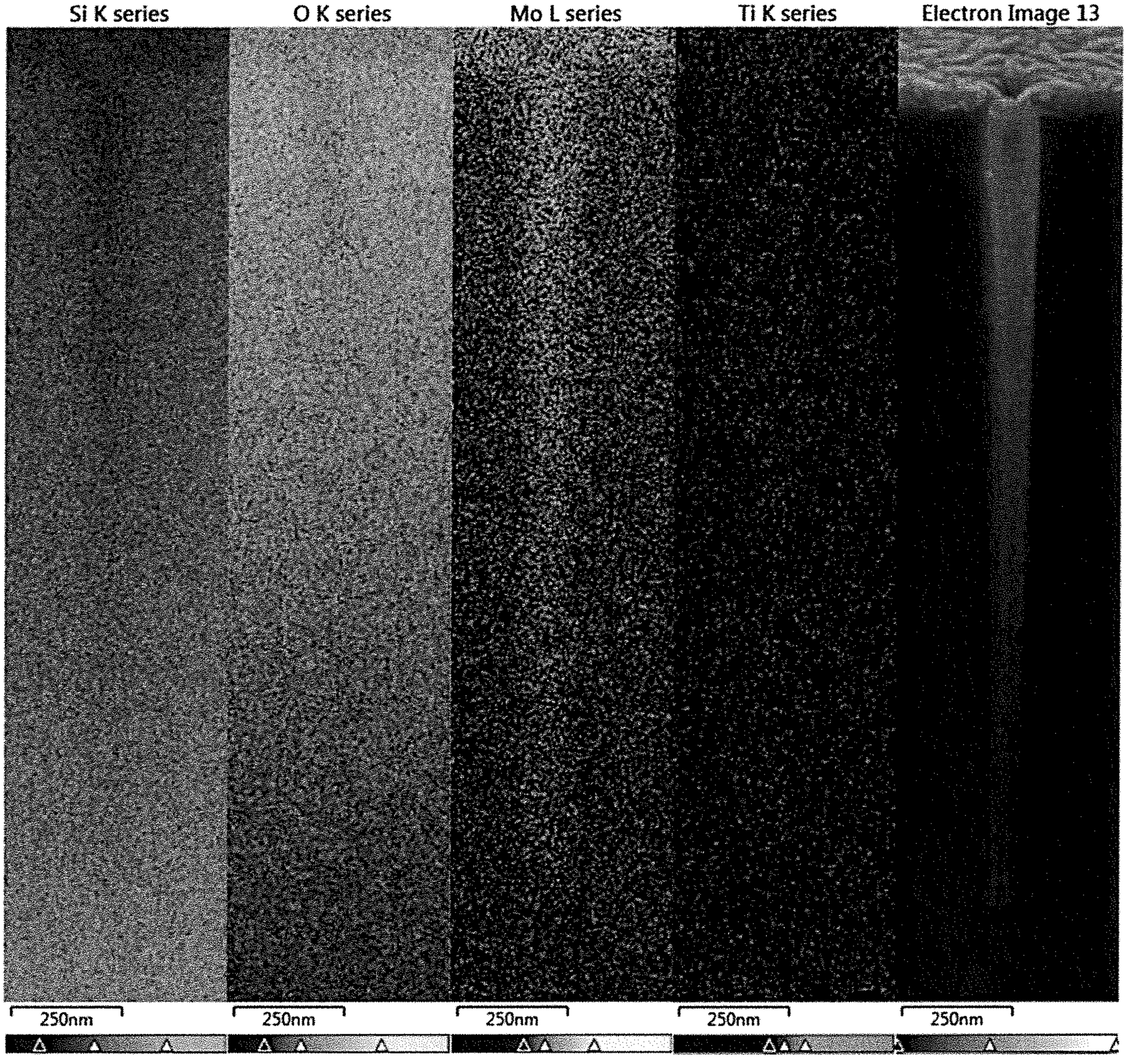
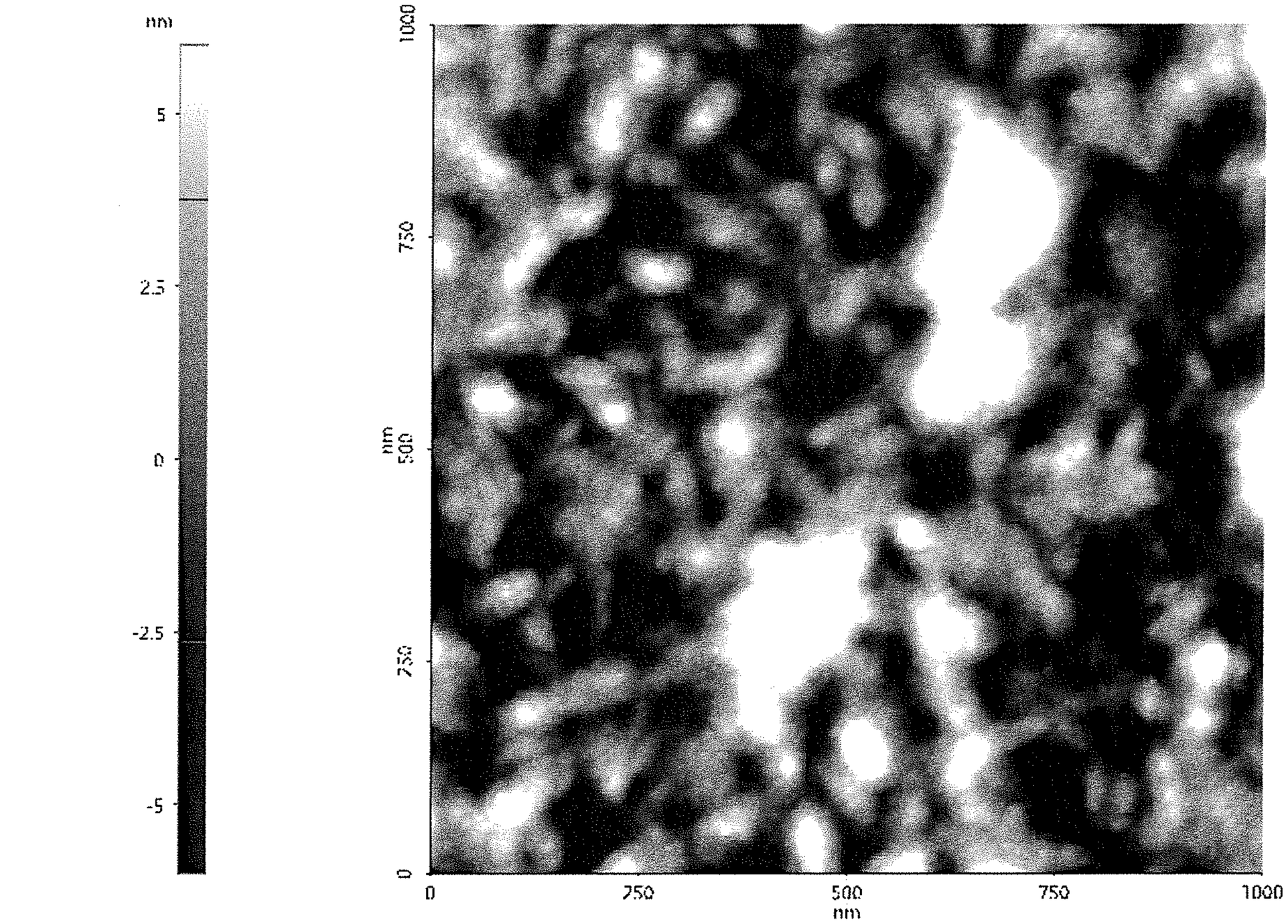
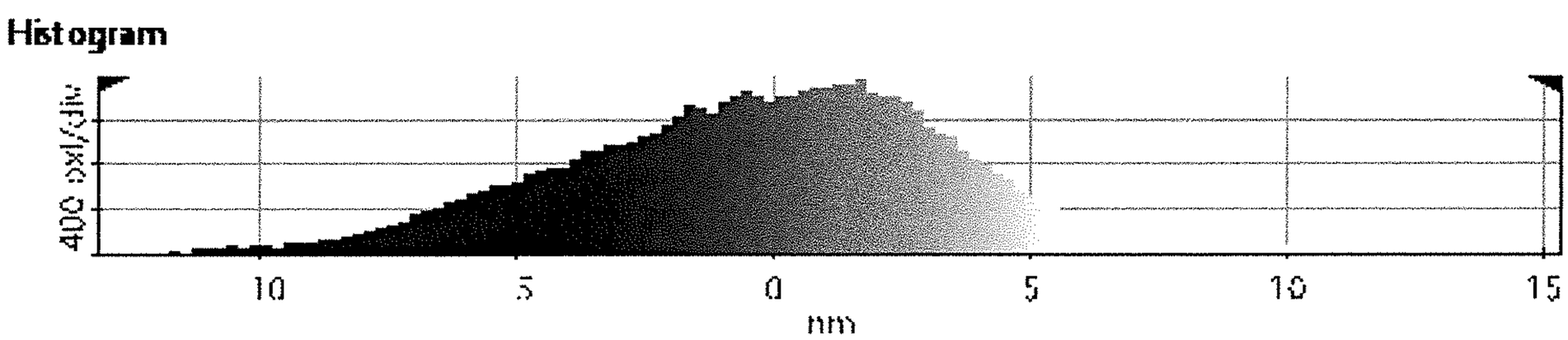

Si K series
O K series
Mo L series
Ti K series
Electron Image 13
250nm
250nm
250nm
250nm
250nm

FIG. 49


nm
5
2.5
0
-2.5
-5
nm
1000
750
500
250
0
0
250
500
750
1000
nm

a.


Histogram
10
5
0
5
10
15
nm

b.

FIG. 50

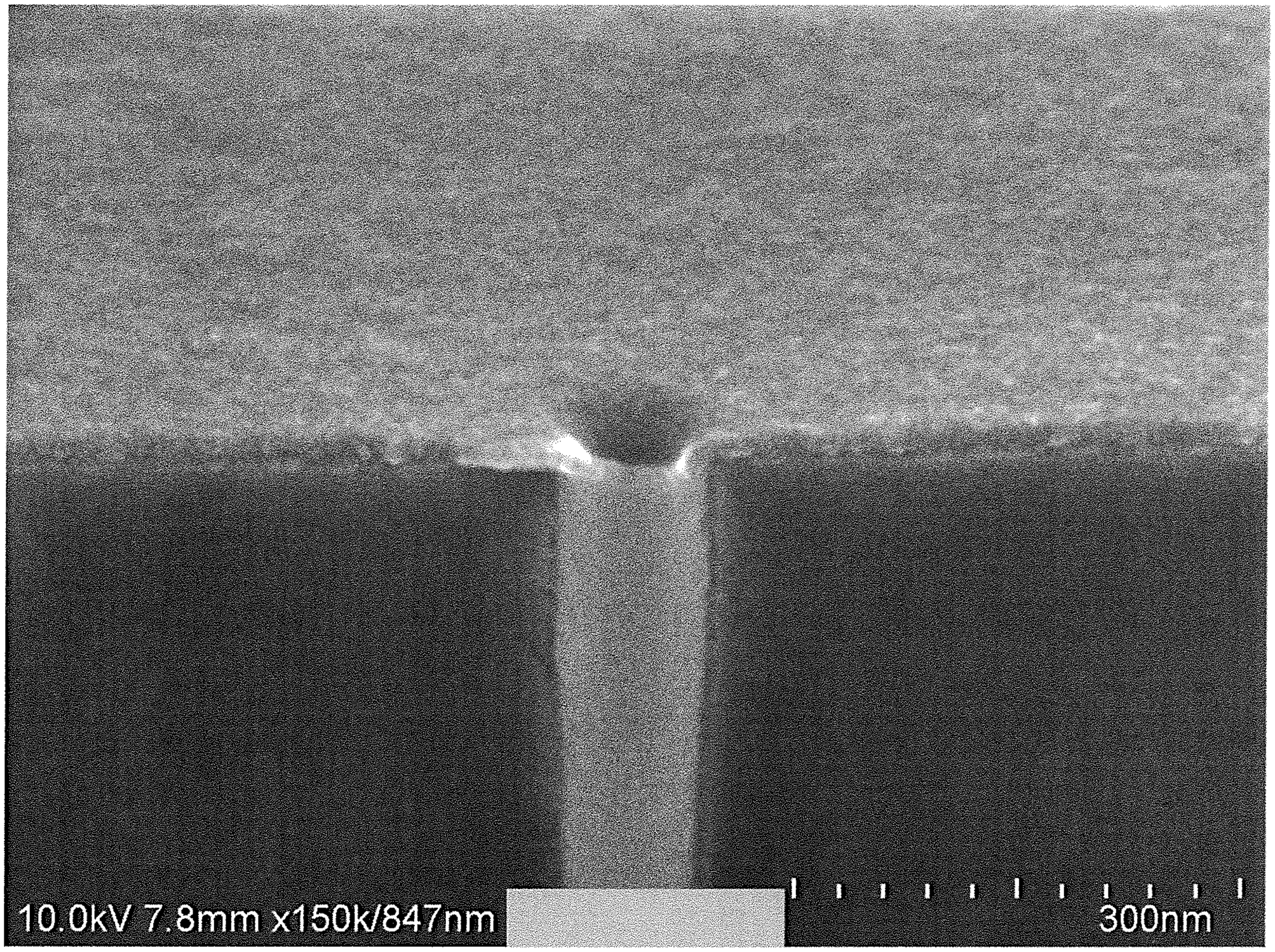


FIG. 51

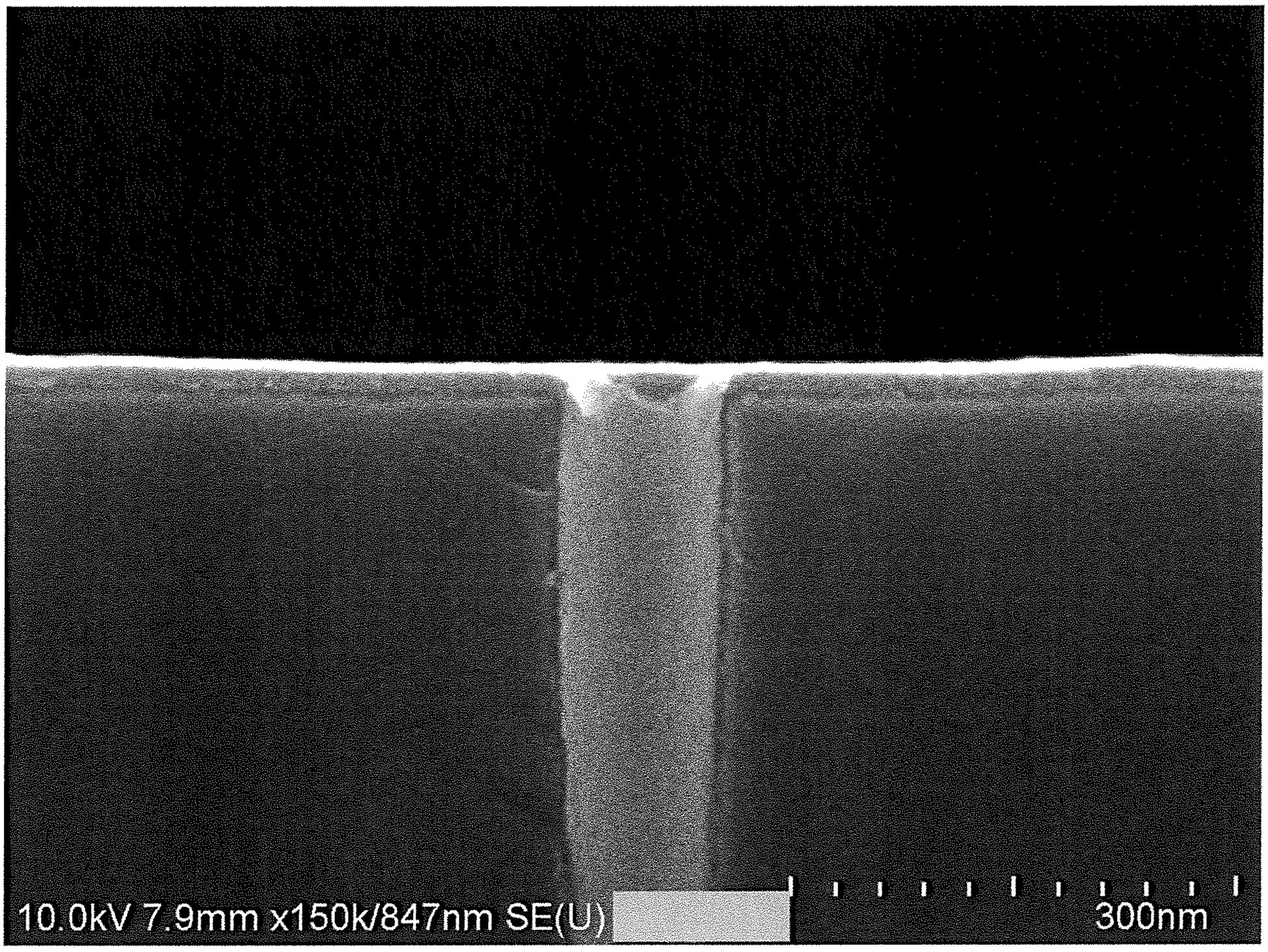


FIG. 52

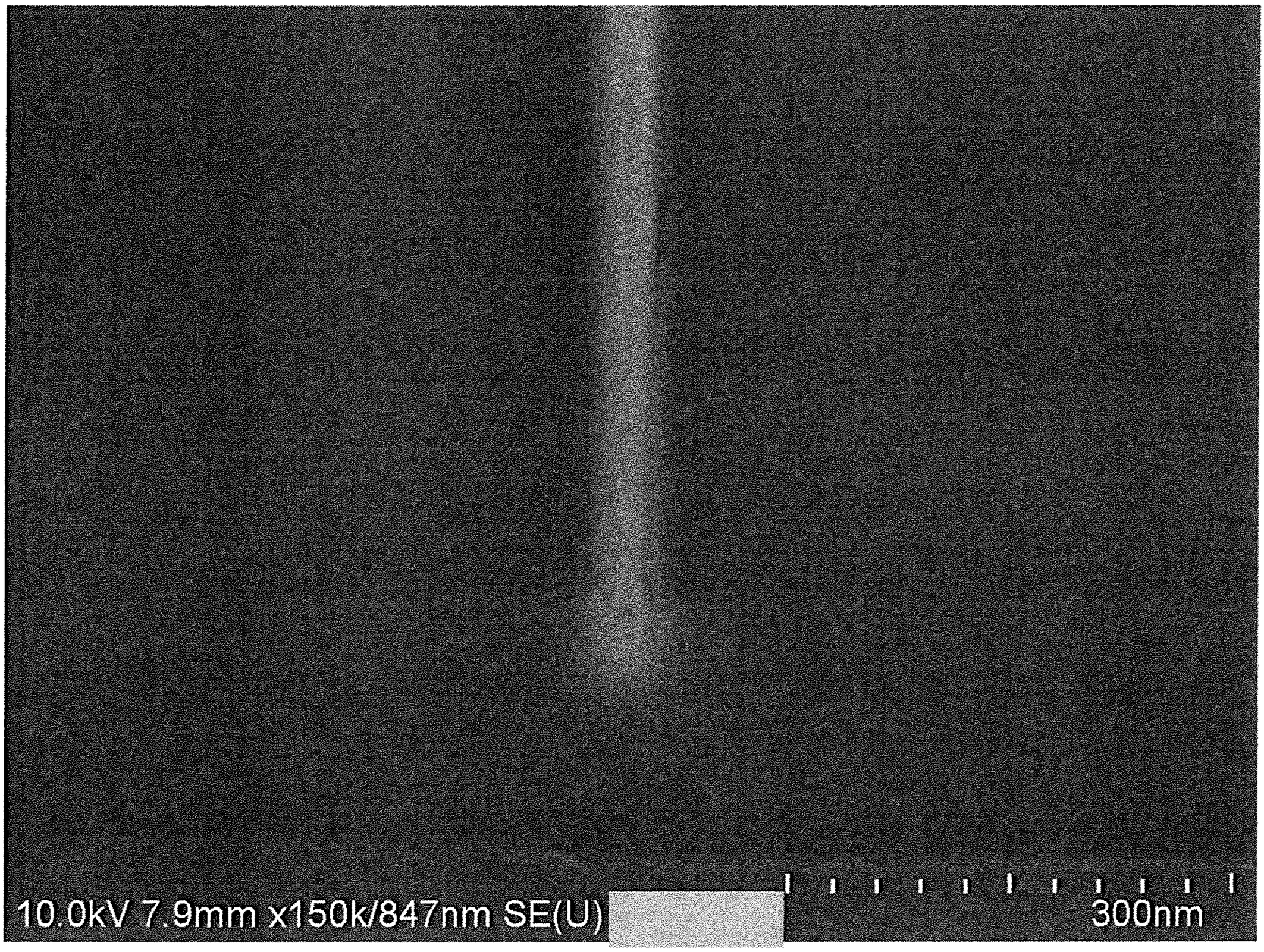


FIG. 53

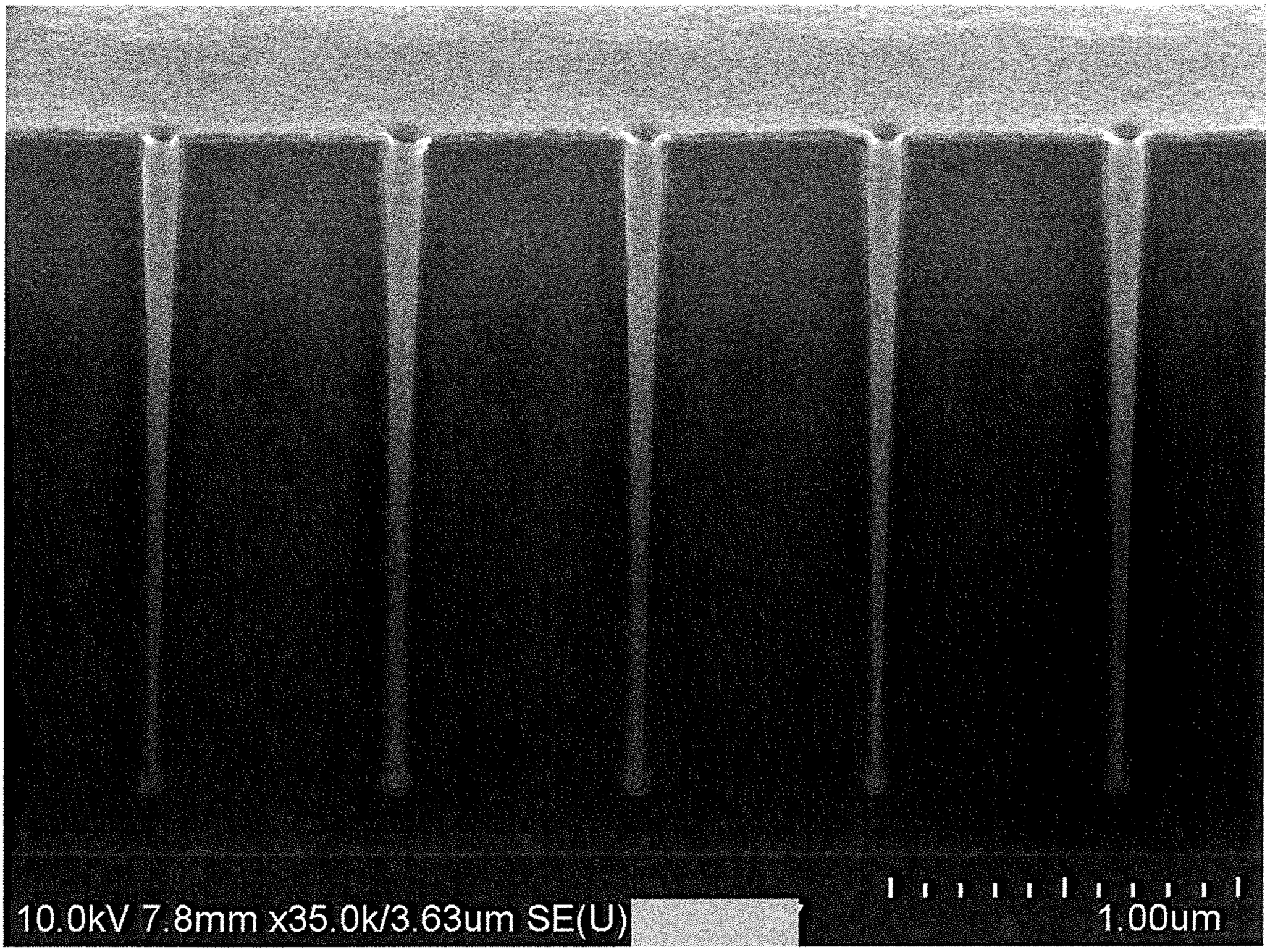


FIG. 54

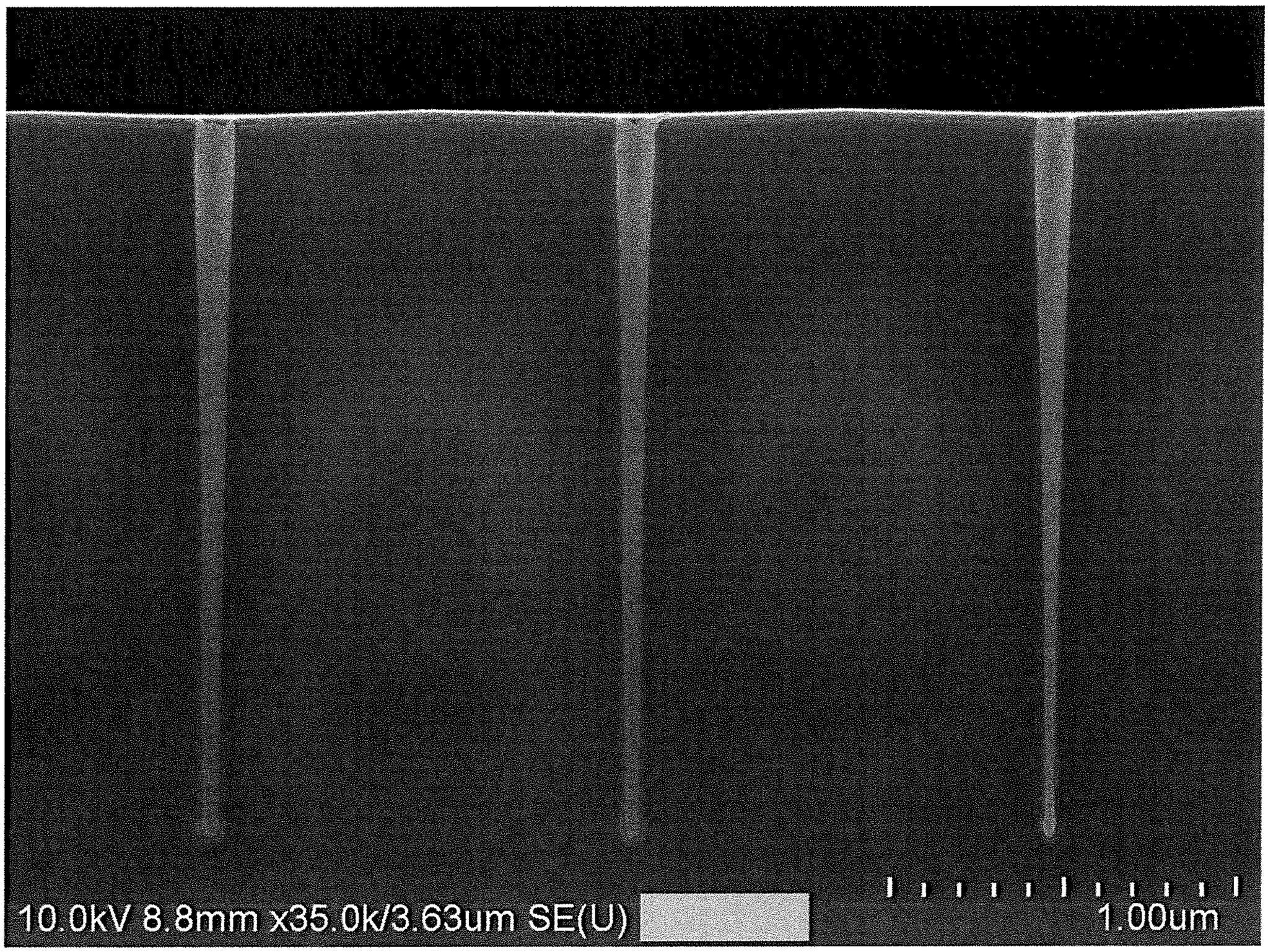
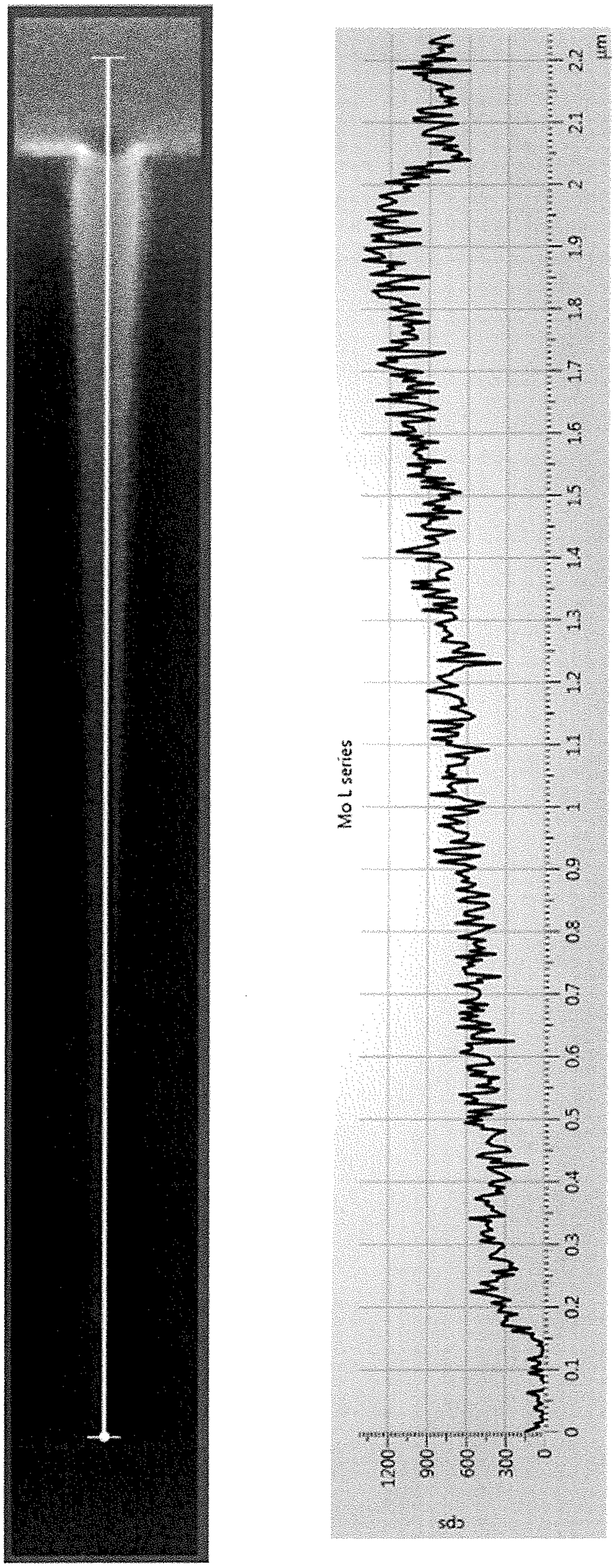


FIG. 55



a. b.

FIG. 56

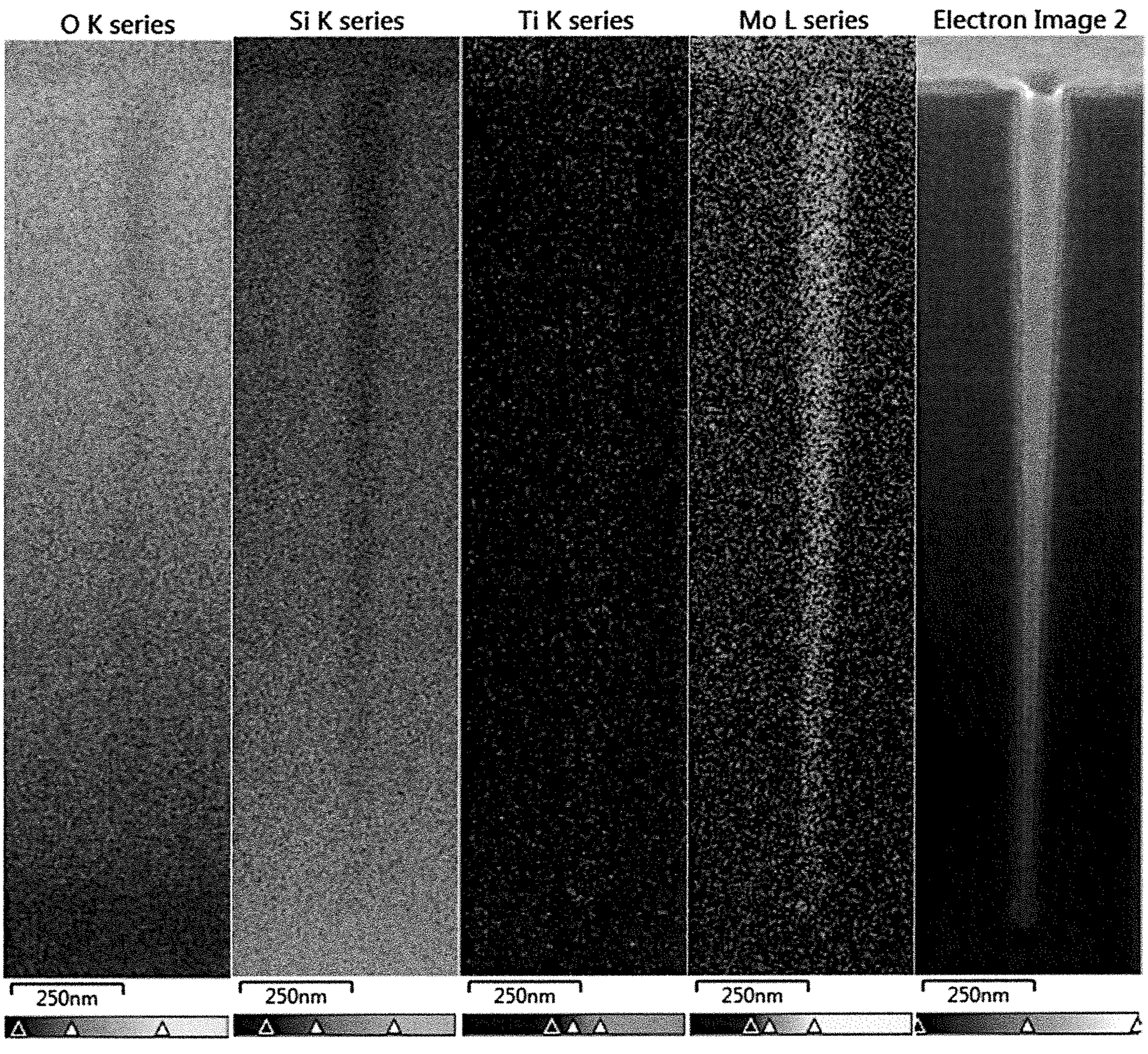
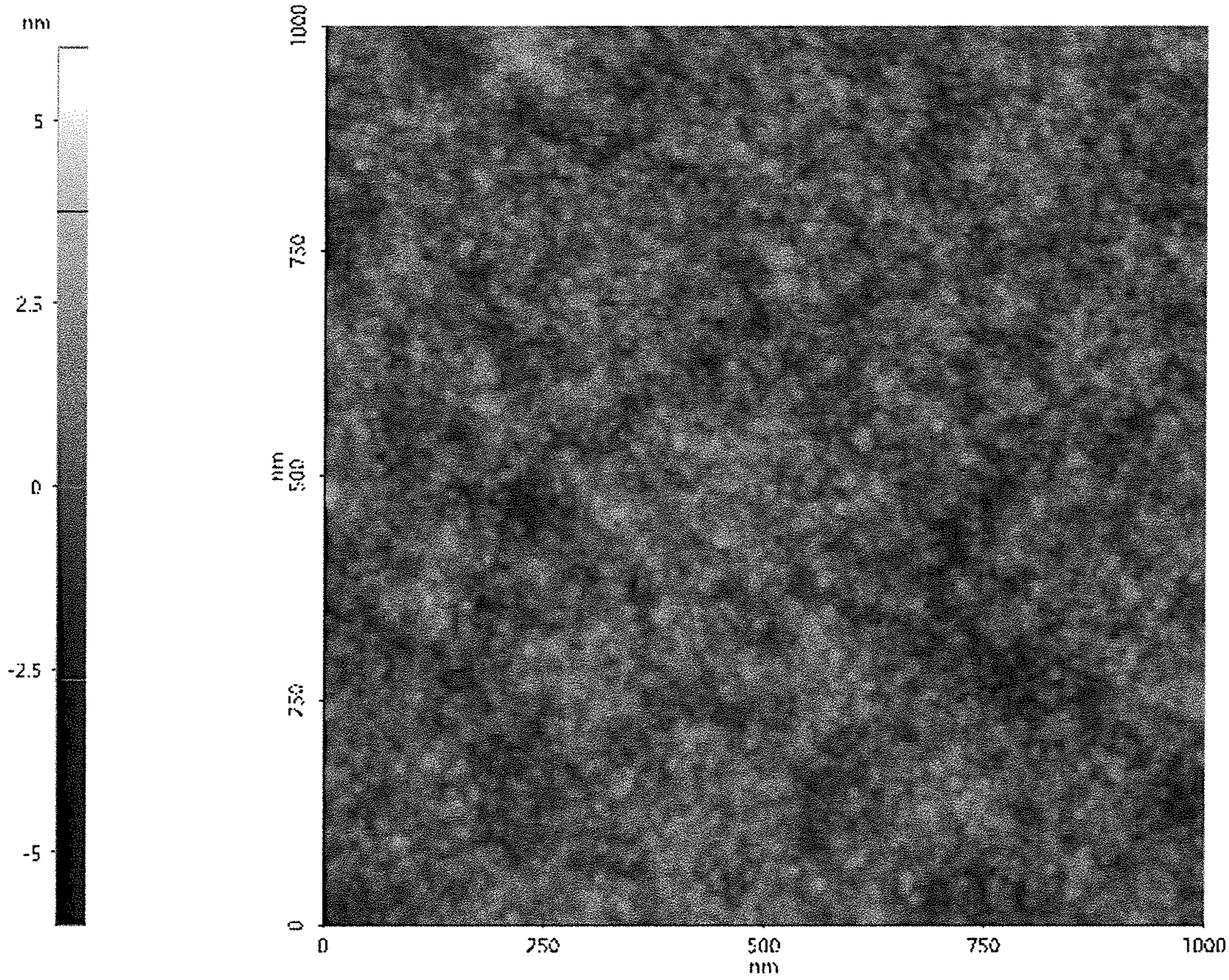
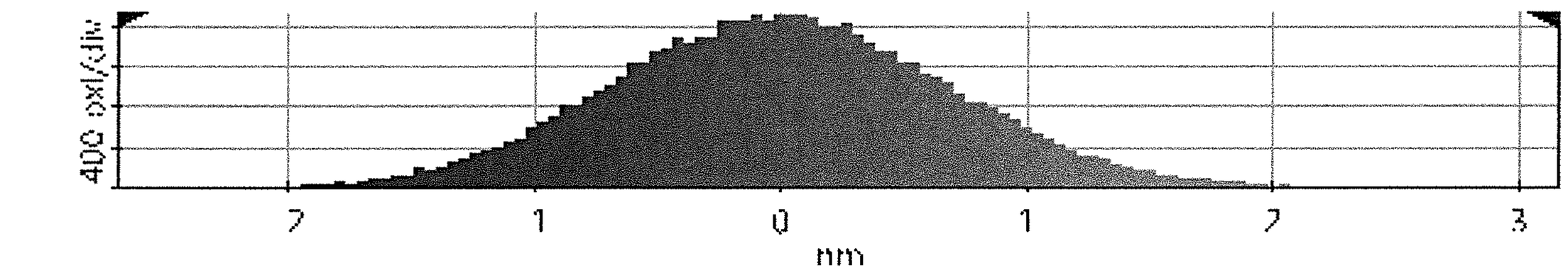

O K series
Si K series
Ti K series
Mo L series
Electron Image 2
250nm
250nm
250nm
250nm
250nm

FIG. 57


nm
5
2.5
0
-2.5
-5
1000
750
500
250
0
nm
0
250
500
750
1000
nm

a.


Histogram
400 cnt/div
3
2
1
0
1
2
3
nm

b.

FIG. 58

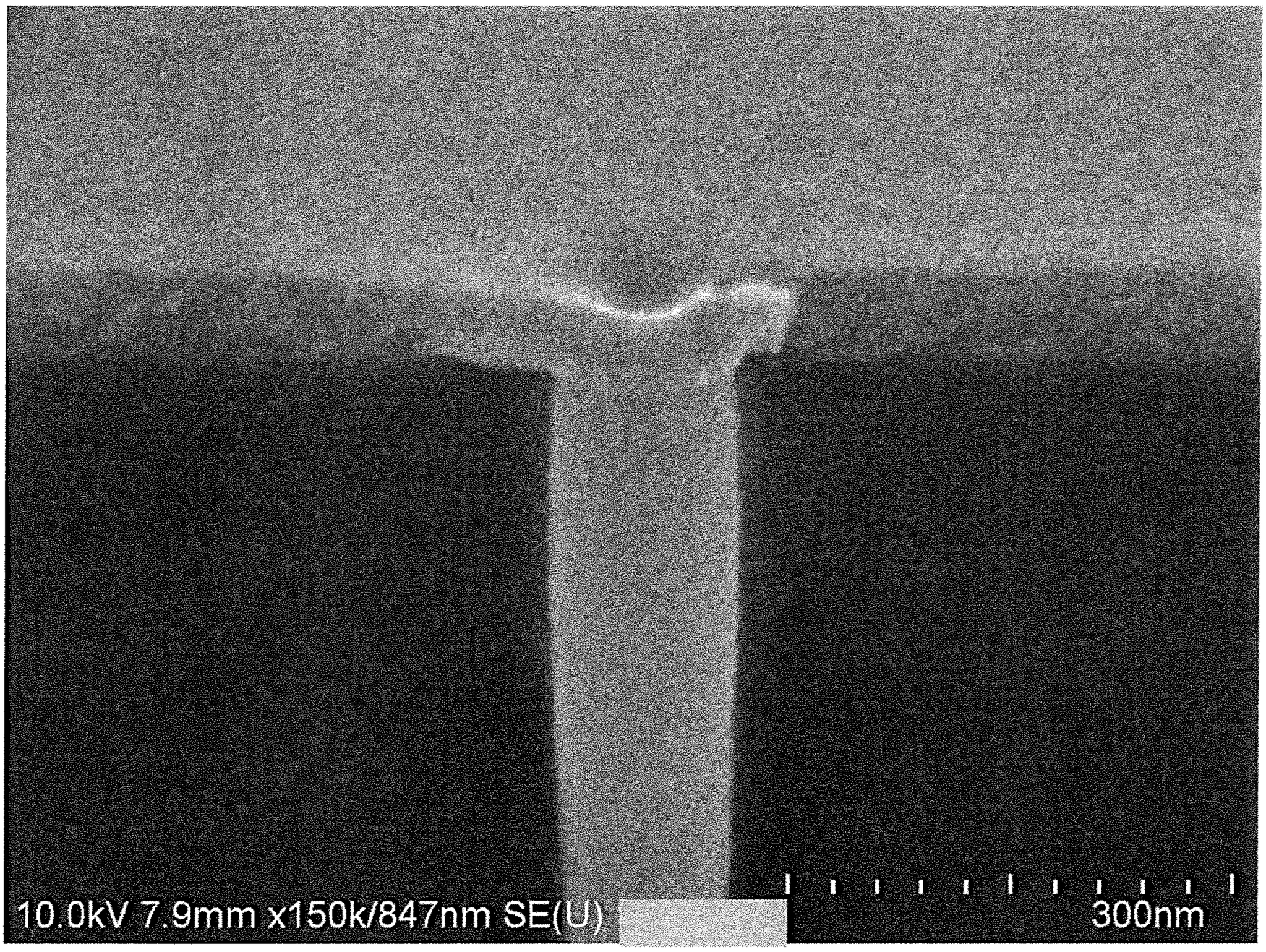


FIG. 59

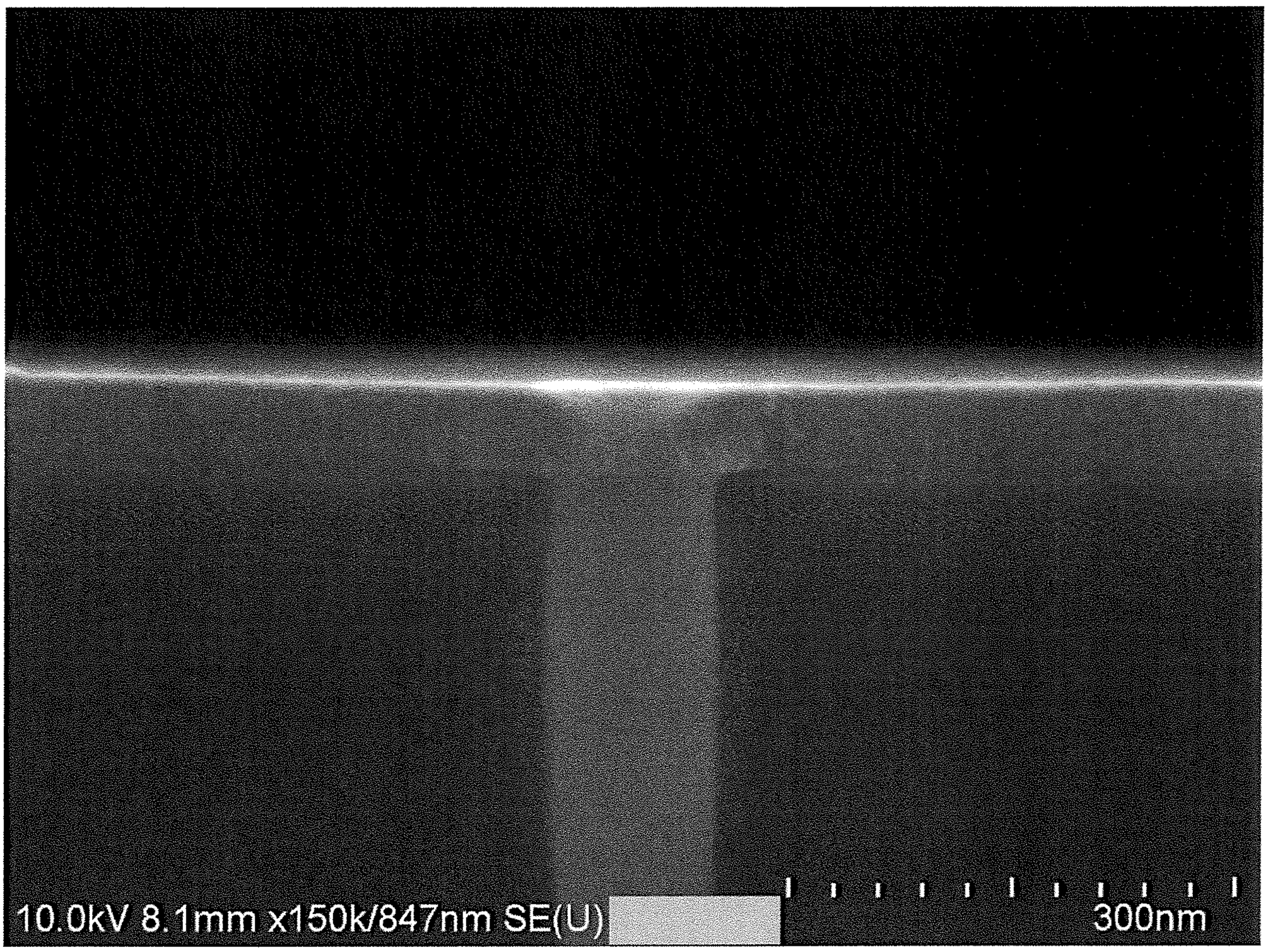


FIG. 60

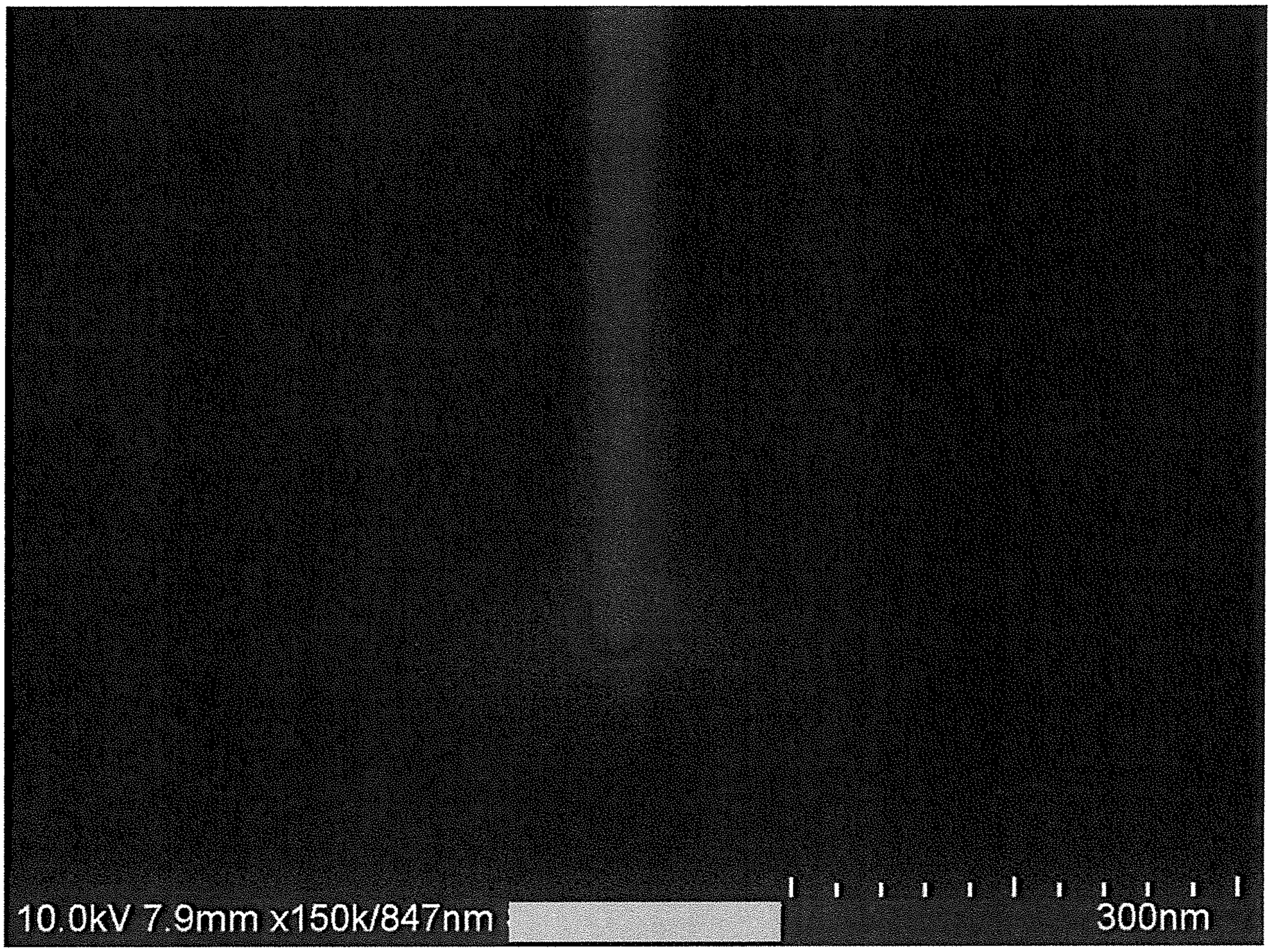


FIG. 61

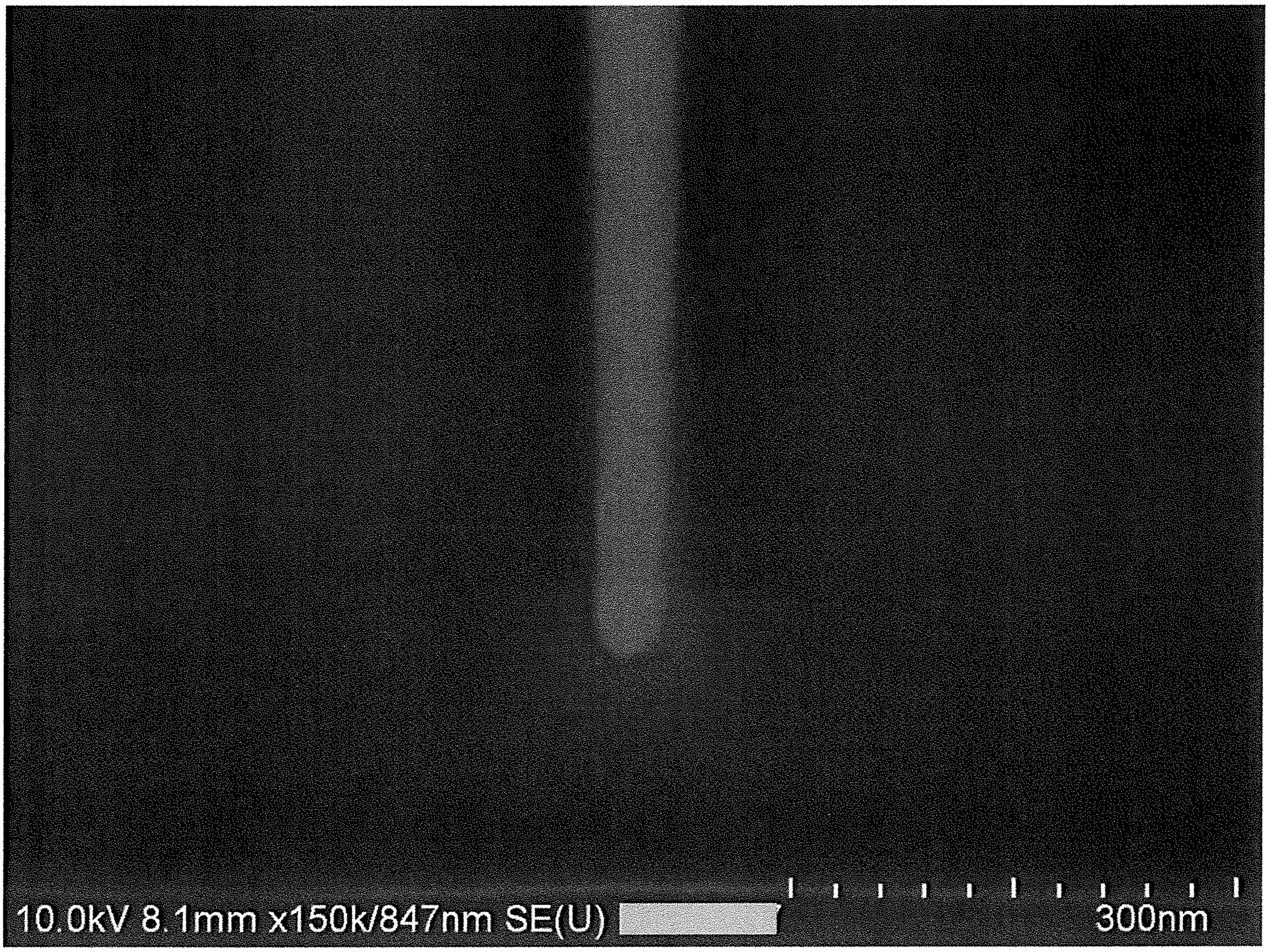


FIG. 62

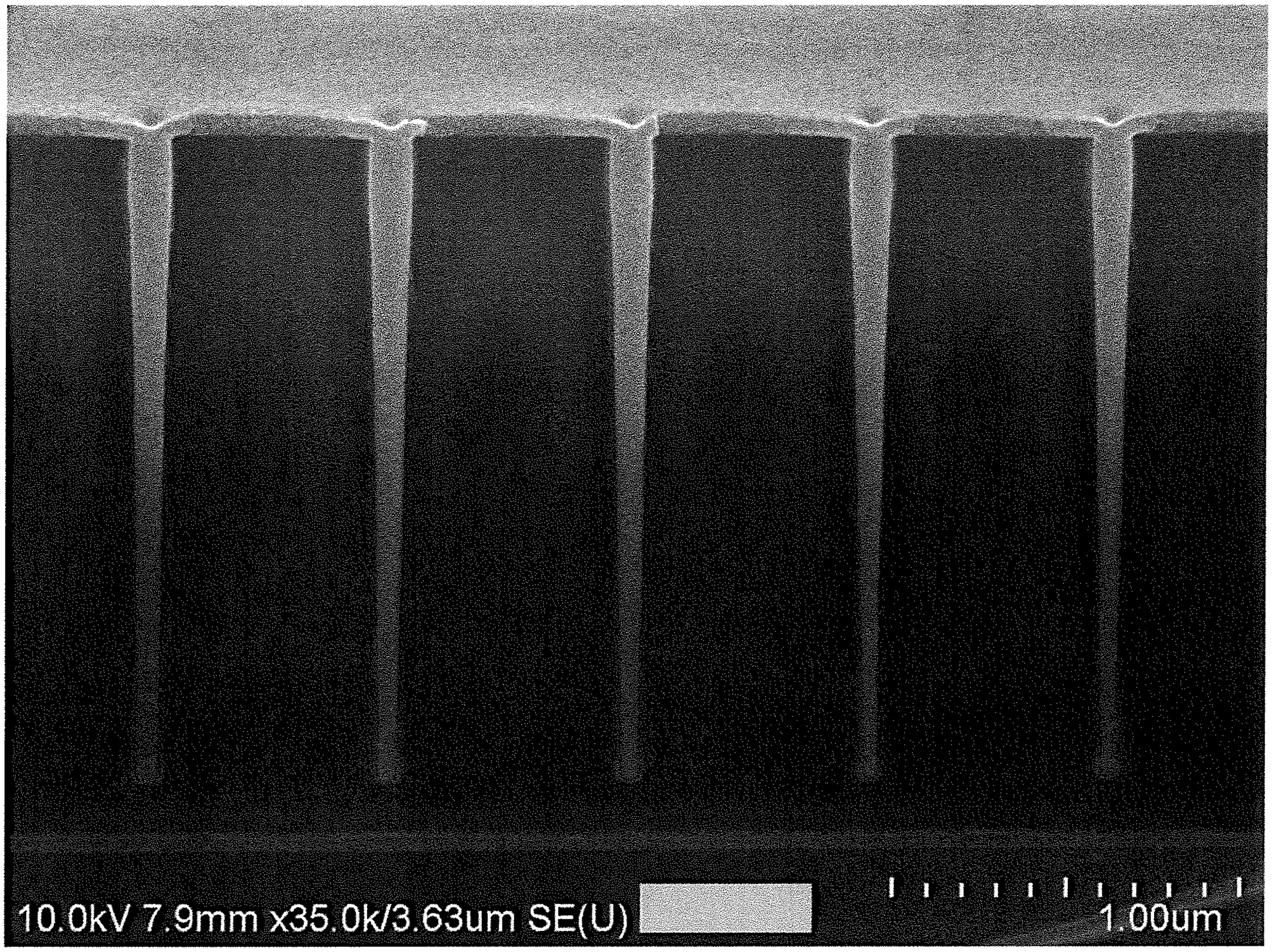


FIG. 63

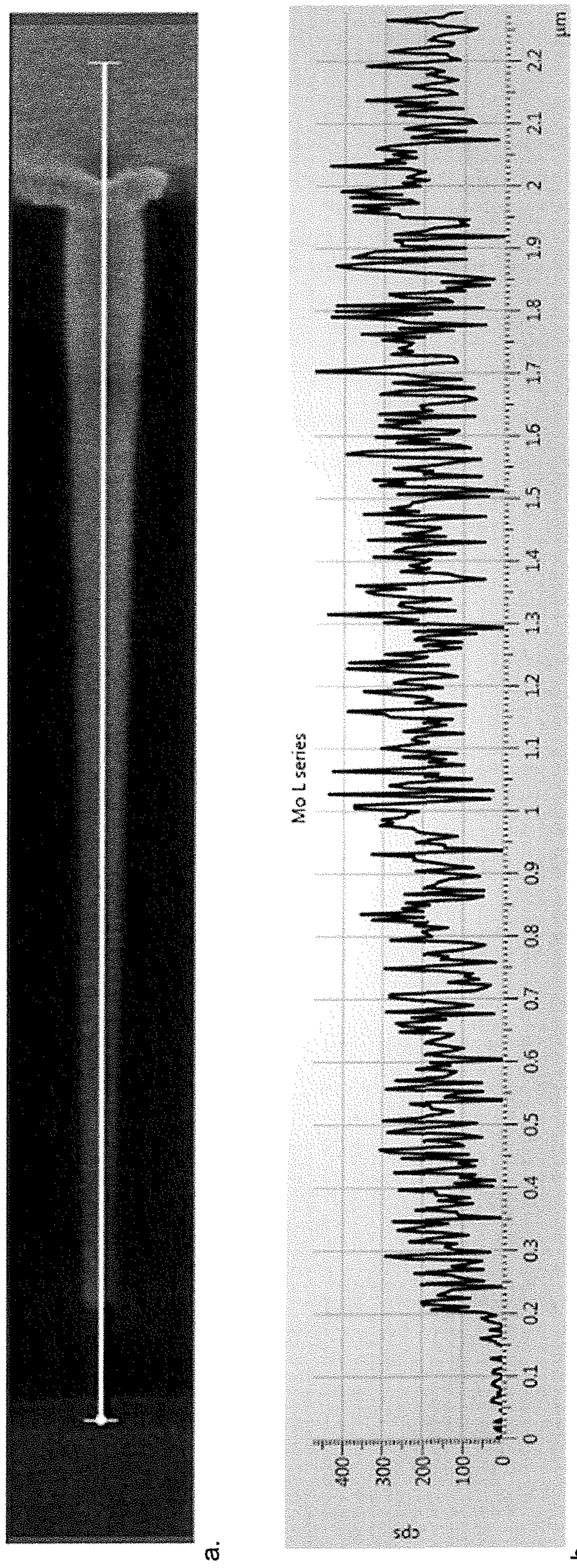

Mo L series
cps
400
300
200
100
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
12
13
14
15
16
17
18
19
2
21
22
µm
a.
b.

FIG. 64

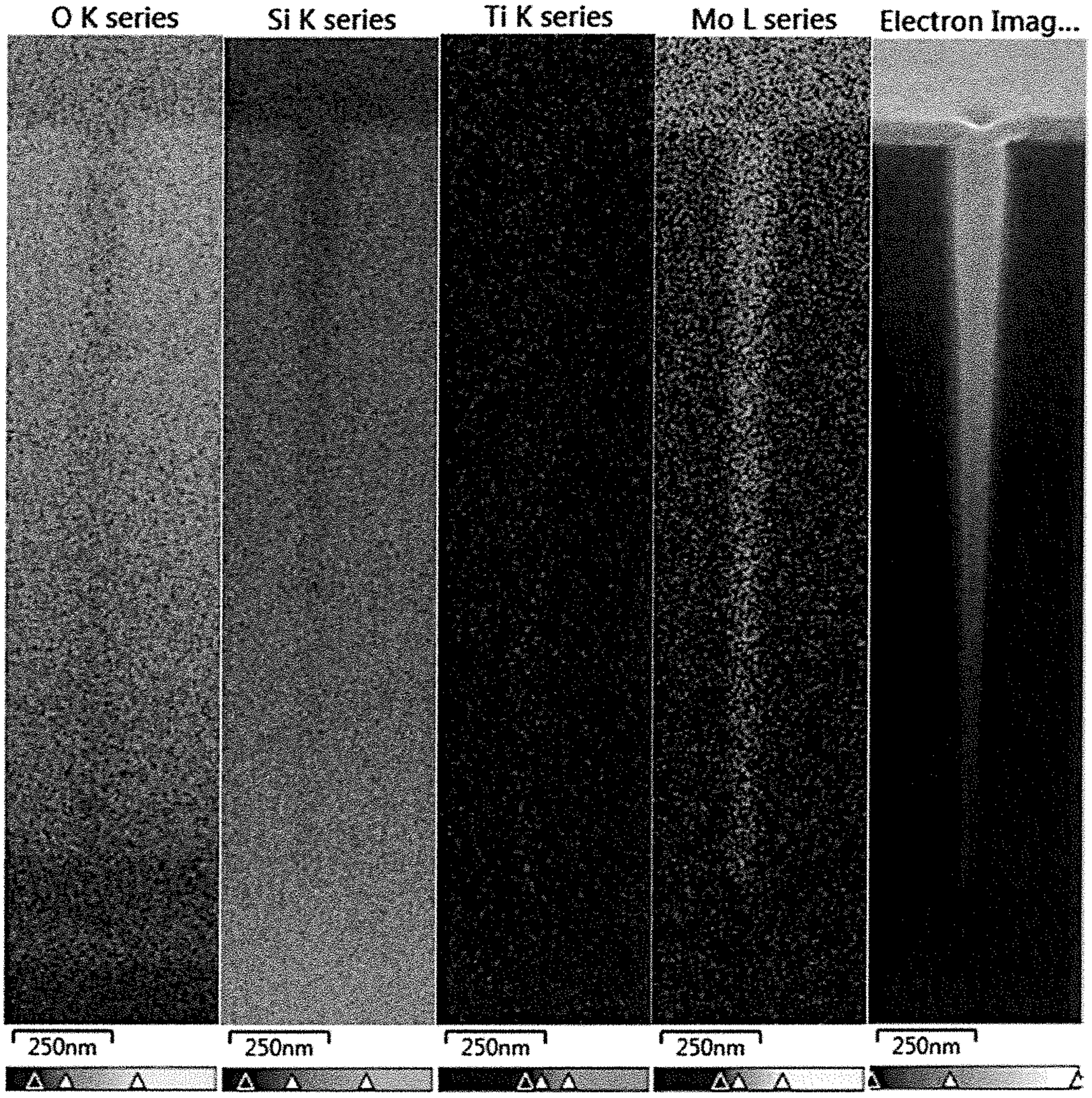
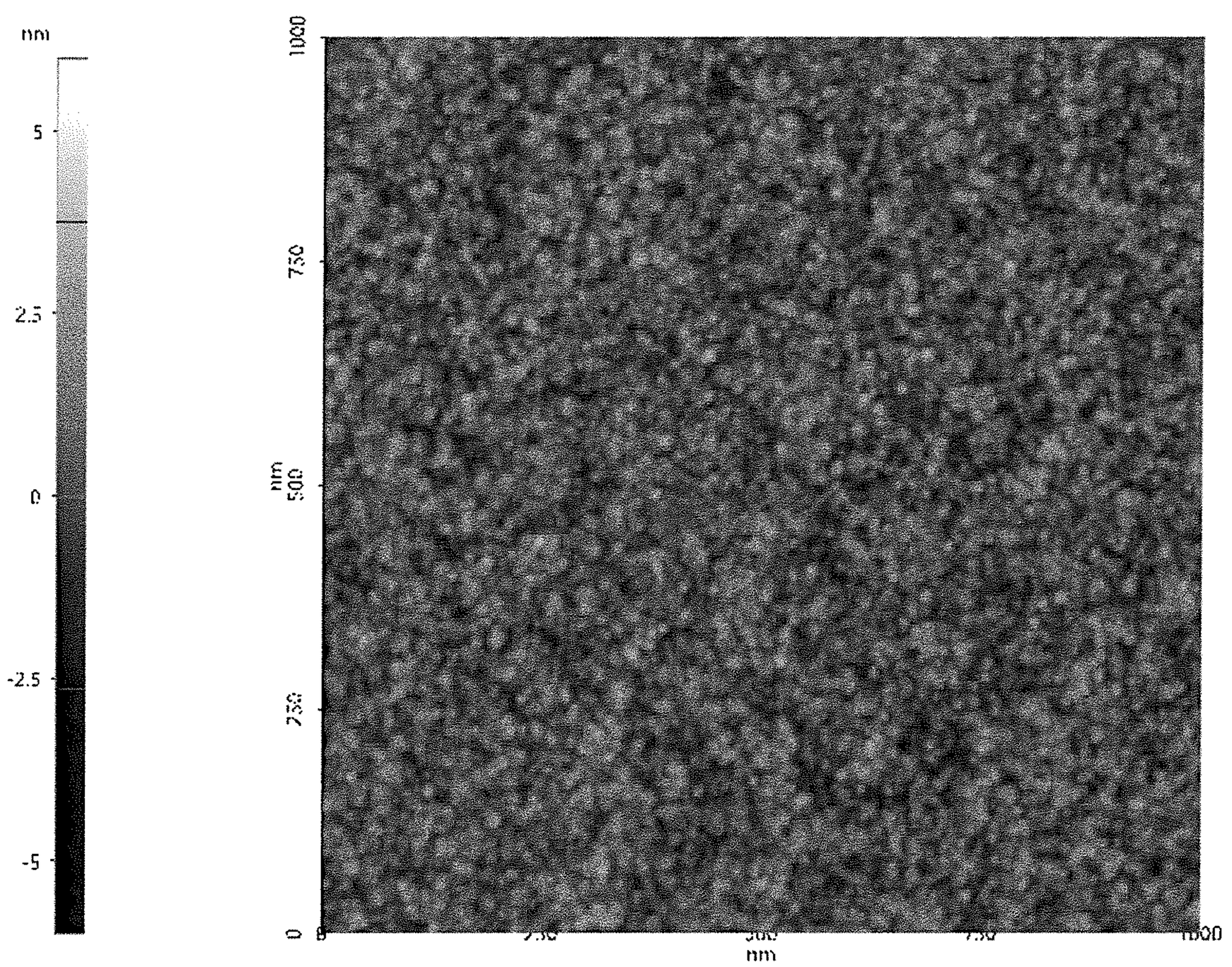
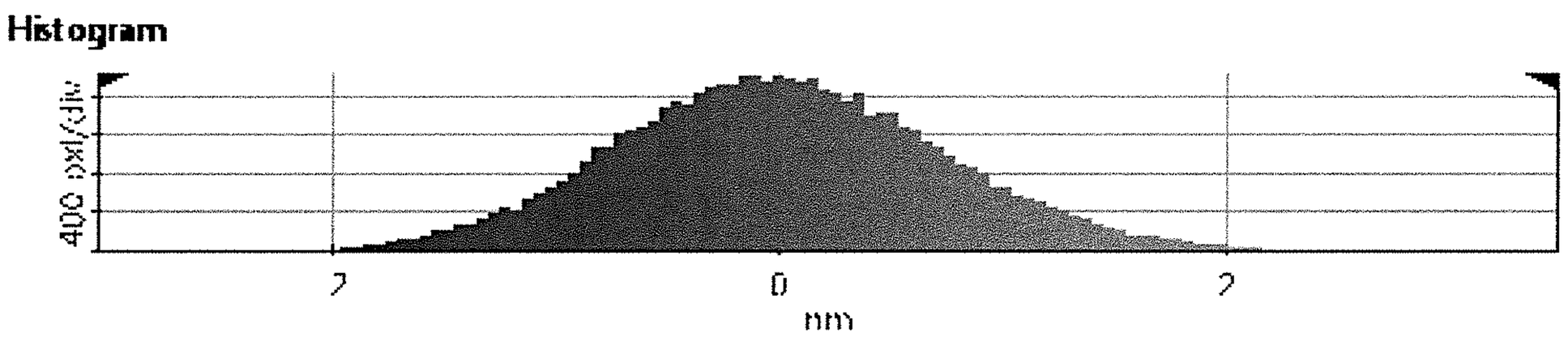

O K series
Si K series
Ti K series
Mo L series
Electron Imag...
250nm
250nm
250nm
250nm
250nm

FIG. 65


nm
5
2.5
0
-2.5
-5
1000
750
500
250
0
nm
0
250
500
750
1000

a.


Histogram
400 pixels
2
0
2
nm

b.

FIG. 66

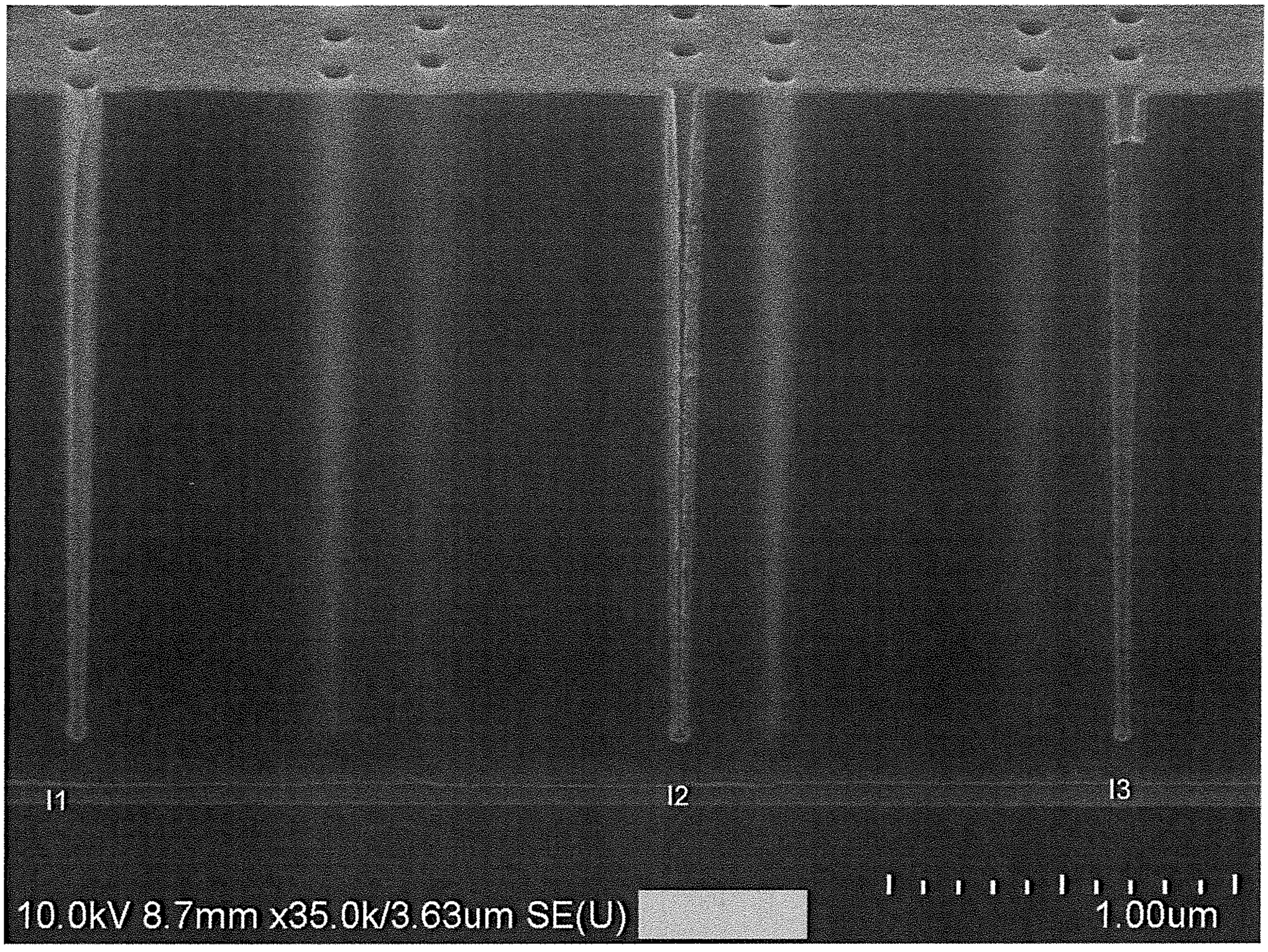


FIG. 67

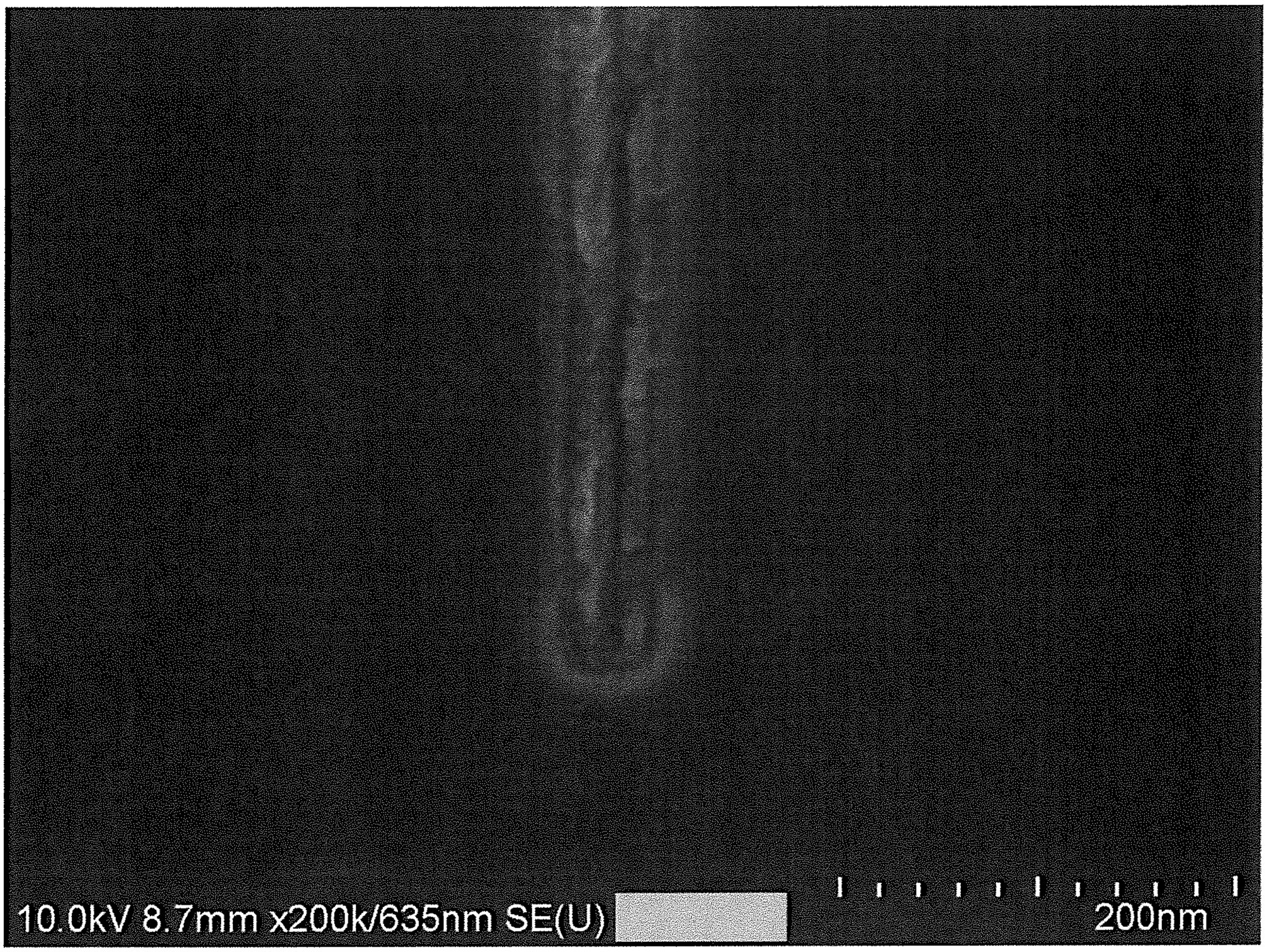


FIG. 68

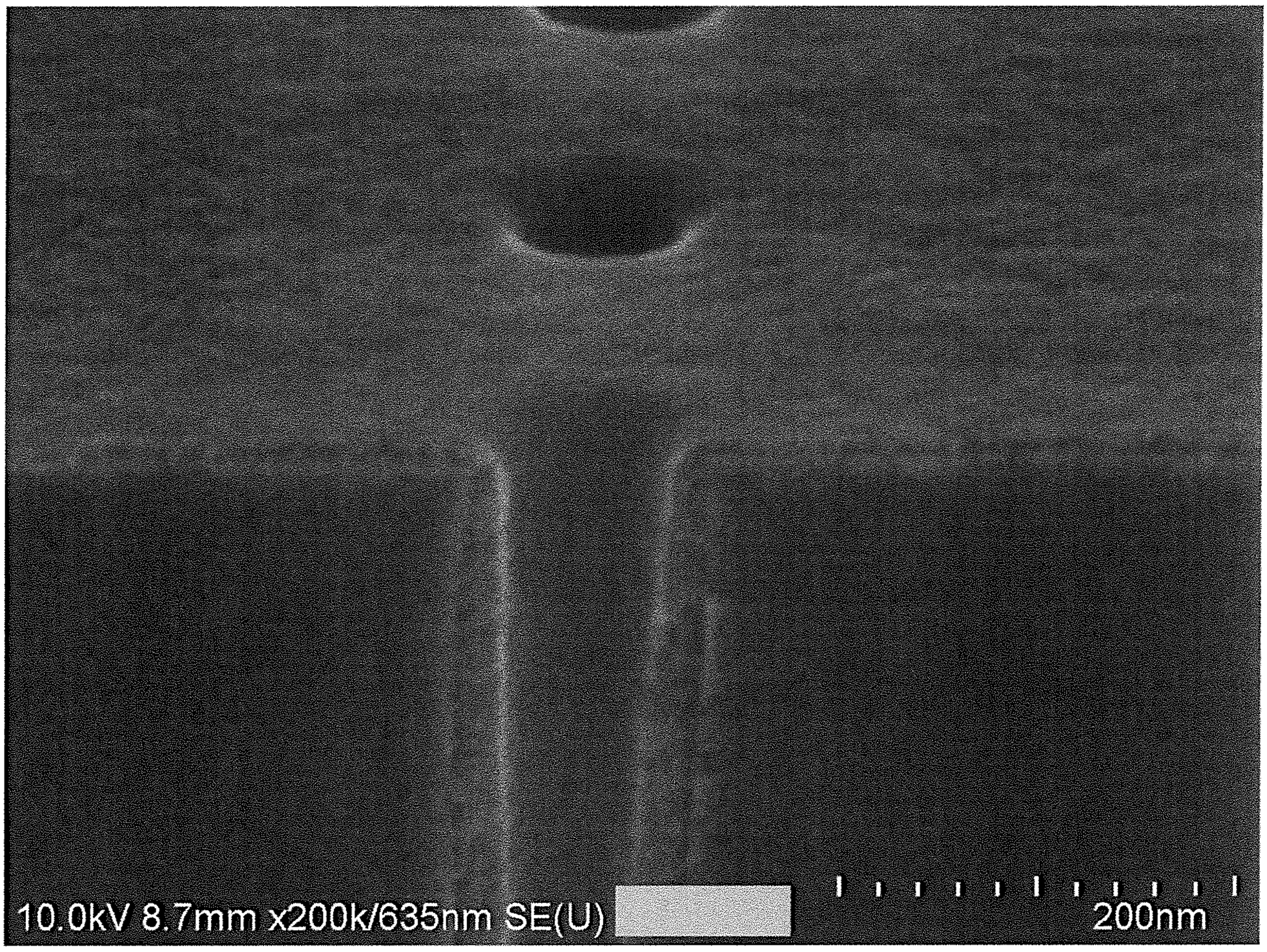


FIG. 69

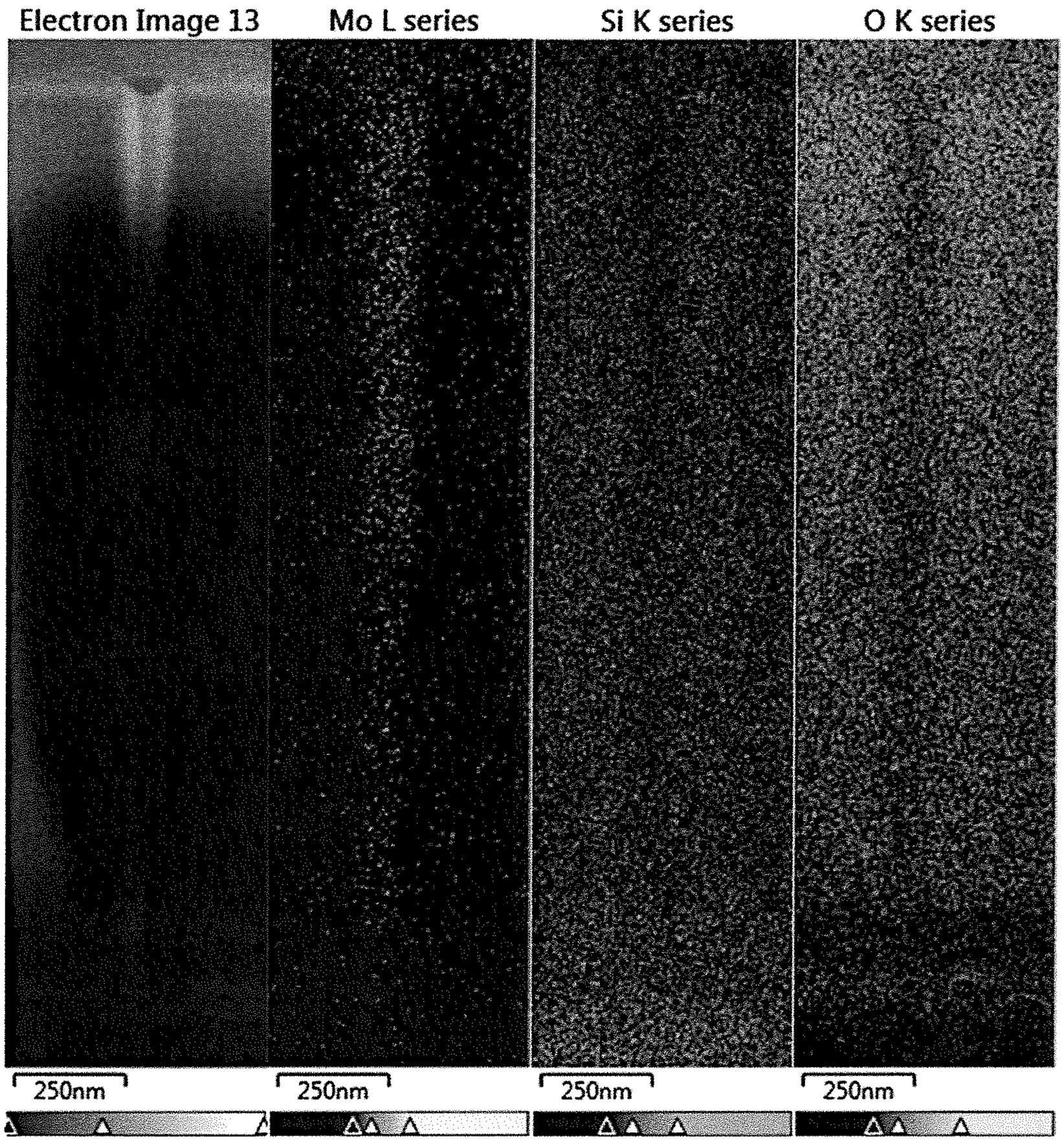
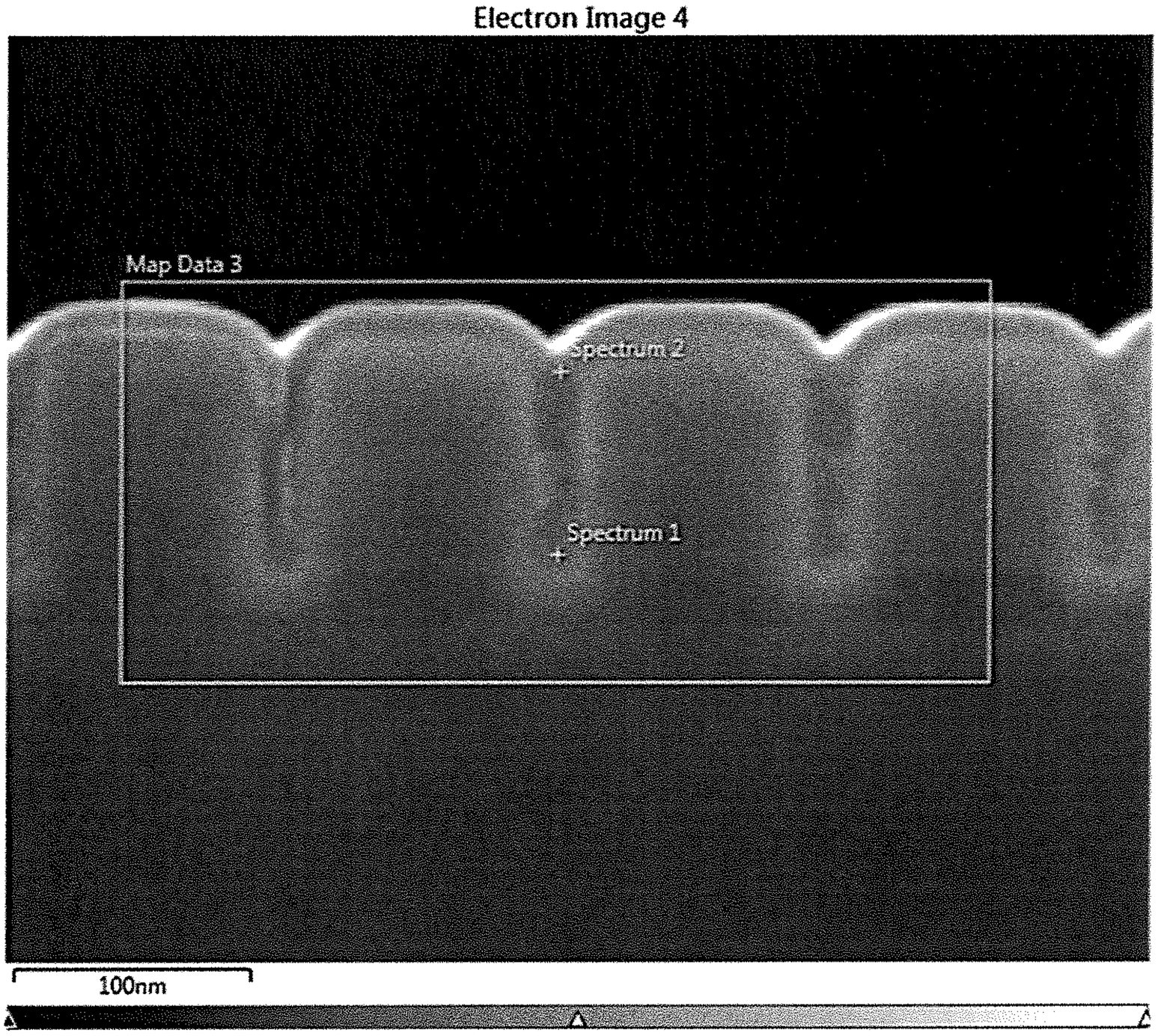

Electron Image 13
Mo L series
Si K series
O K series
250nm
250nm
250nm
250nm

FIG. 70

a.


Electron Image 4
Map Data 3
Spectrum 2
Spectrum 1
100nm

b.

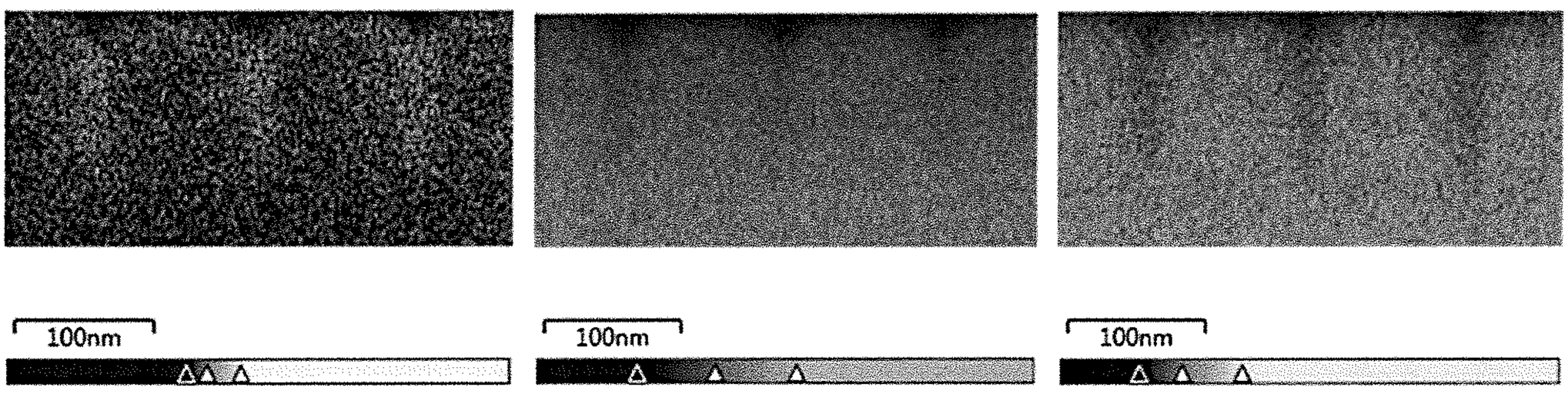

Mo L series
Si K series
O K series
100nm
100nm
100nm

FIG. 71

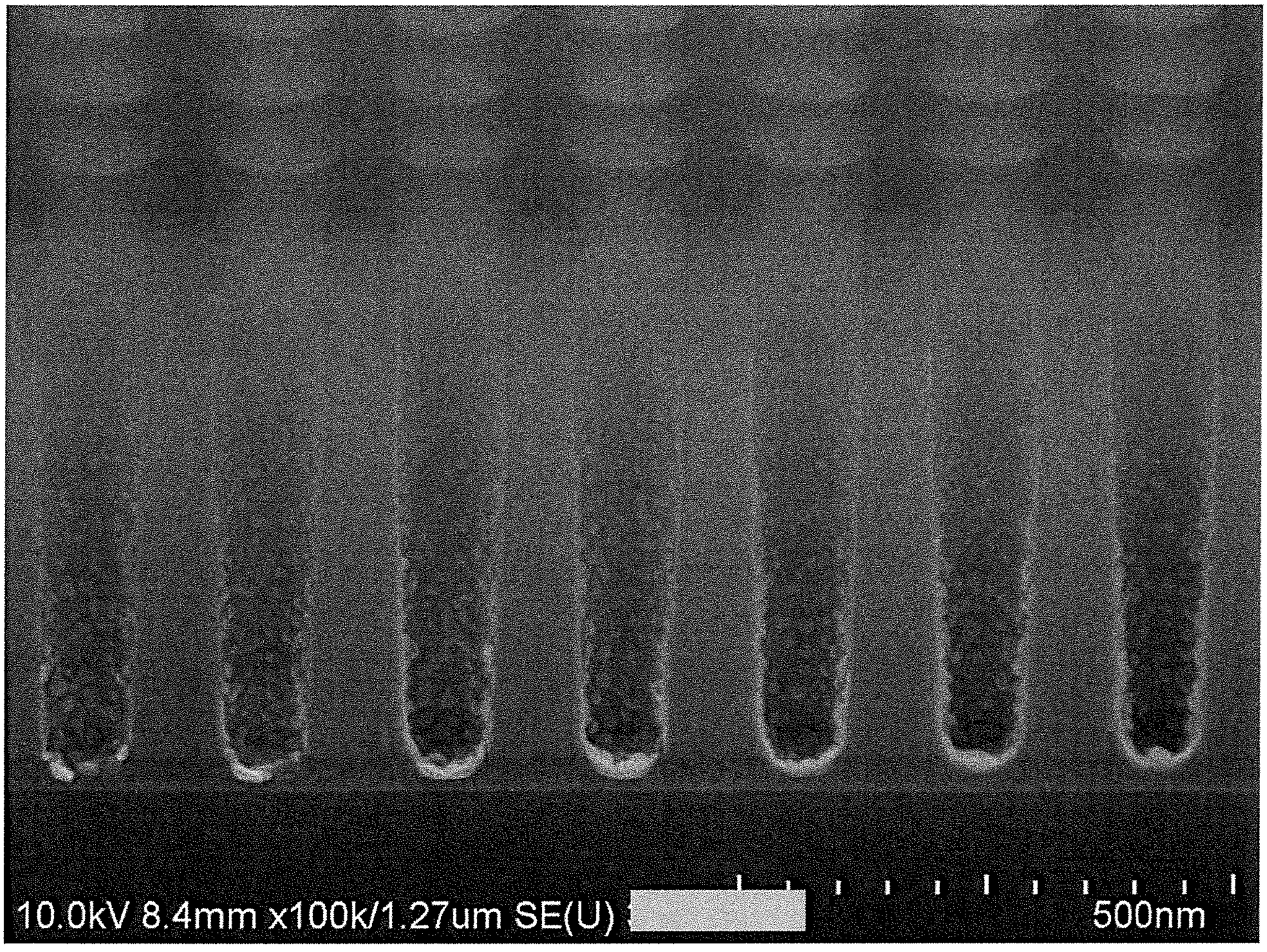


FIG. 72

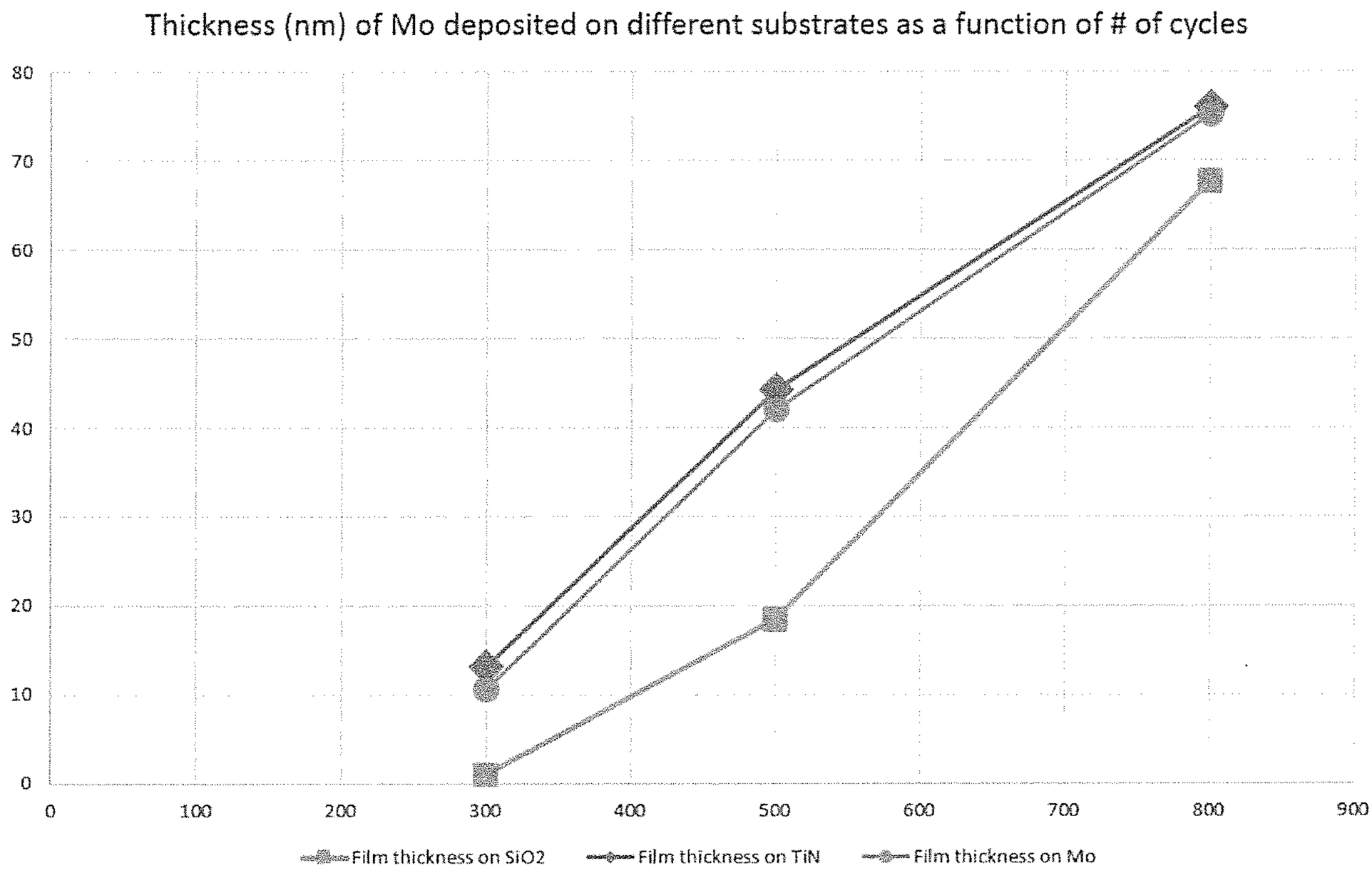

Thickness (nm) of Mo deposited on different substrates as a function of # of cycles
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
700
800
900
Film thickness on SiO2
Film thickness on TiN
Film thickness on Mo

FIG. 73

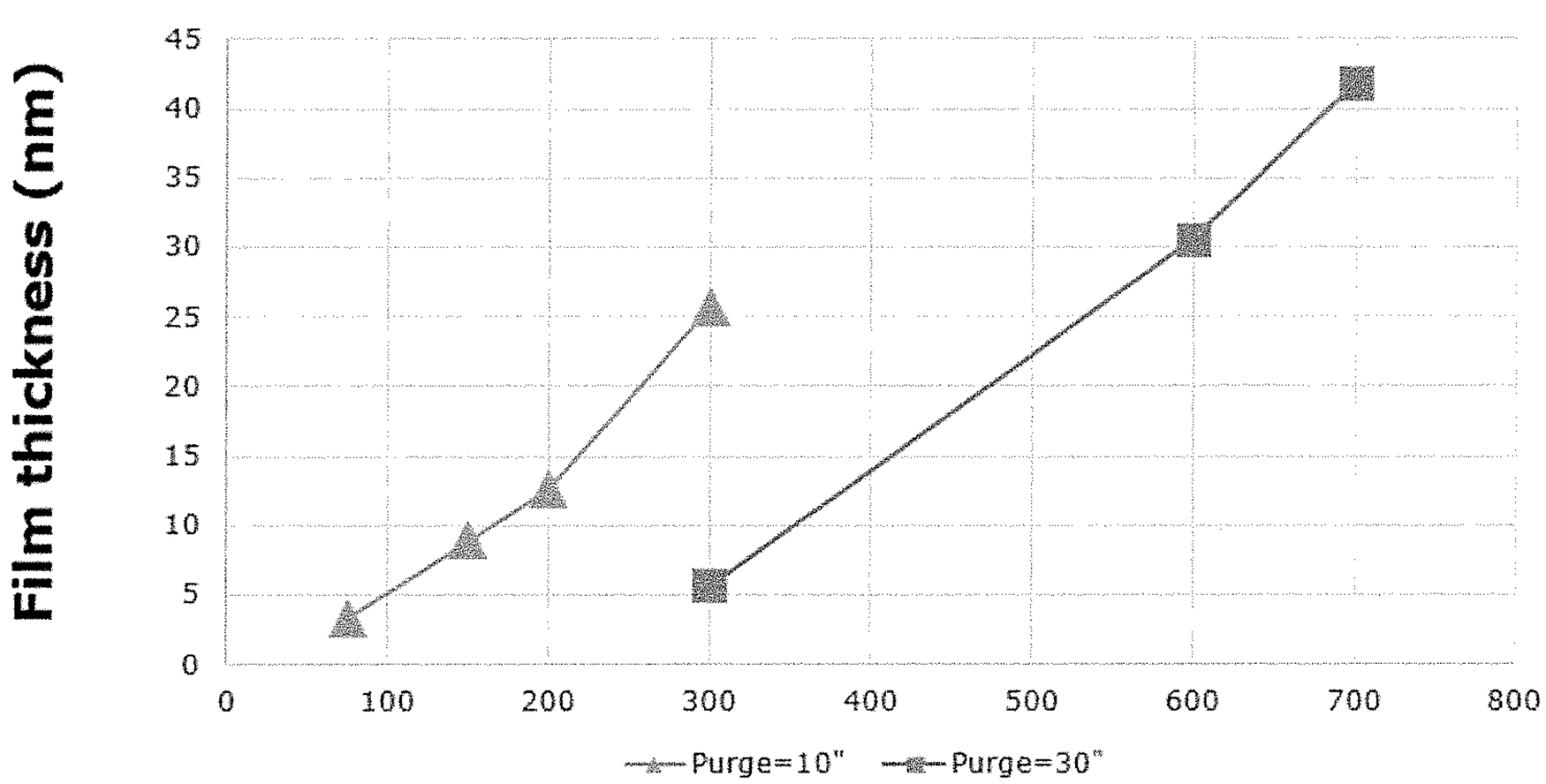

Thickness as a function of # of cycles for 2 purge conditions
Film thickness (nm)
0
5
10
15
20
25
30
35
40
45
0
100
200
300
400
500
600
700
800
Purge=10"
Purge=30"
Number of cycles

FIG. 74