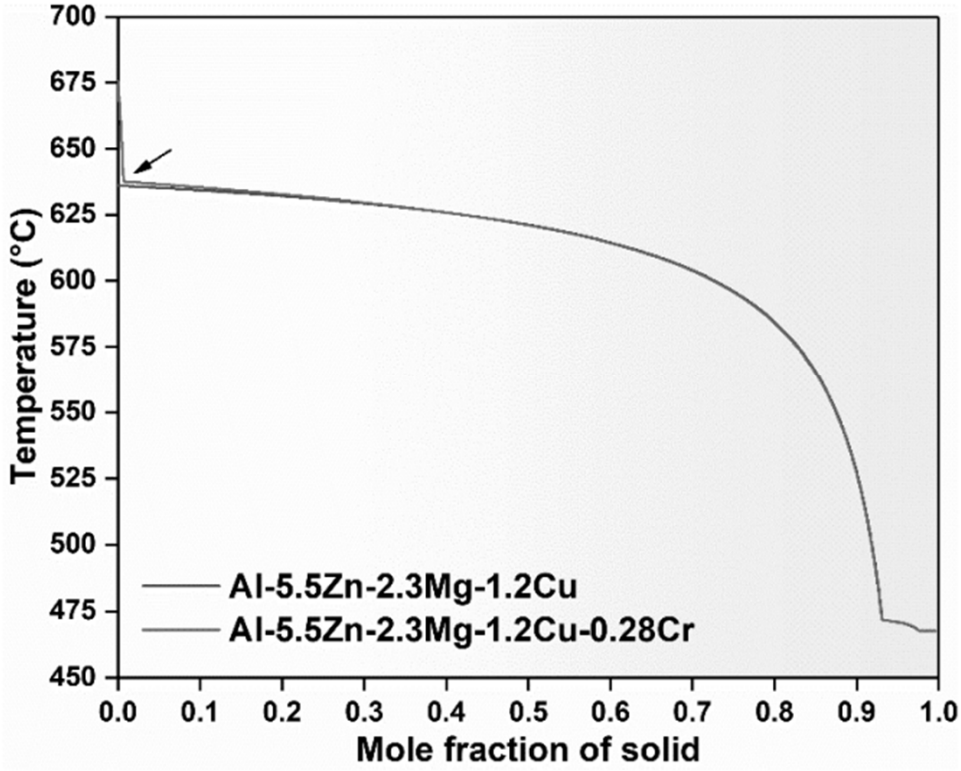

Temperature (°C)
Mole fraction of solid
Al-5.5Zn-2.3Mg-1.2Cu
Al-5.5Zn-2.3Mg-1.2Cu-0.28Cr

FIG. 1

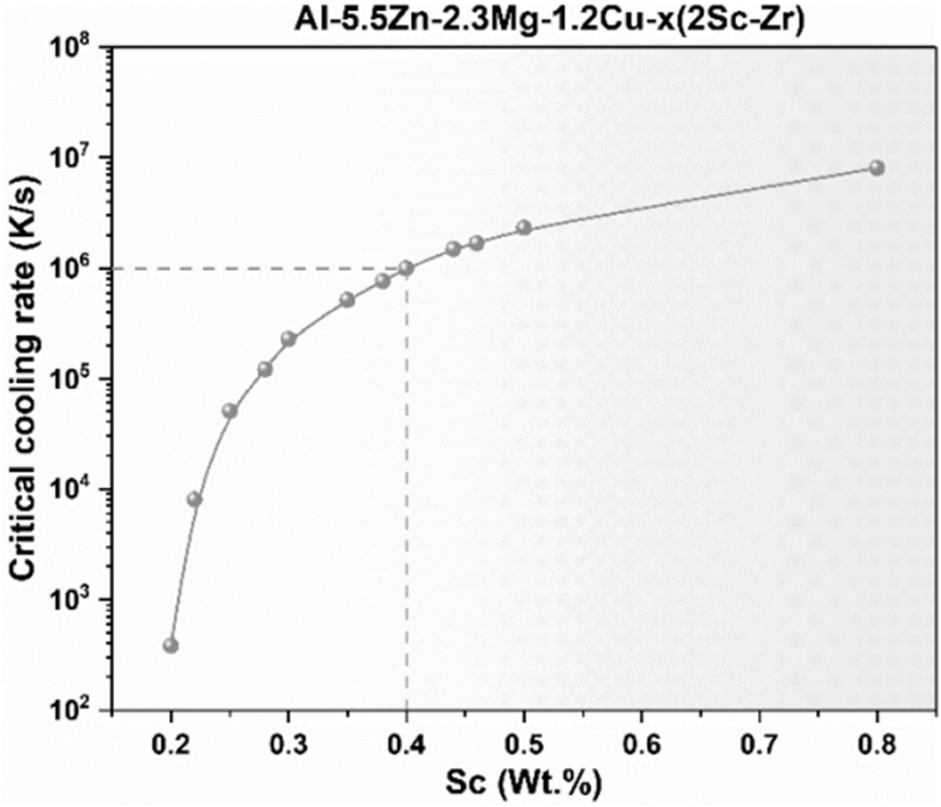

Al-5.5Zn-2.3Mg-1.2Cu-x(2Sc-Zr)
Critical cooling rate (K/s)
Sc (Wt.%)

FIG. 2

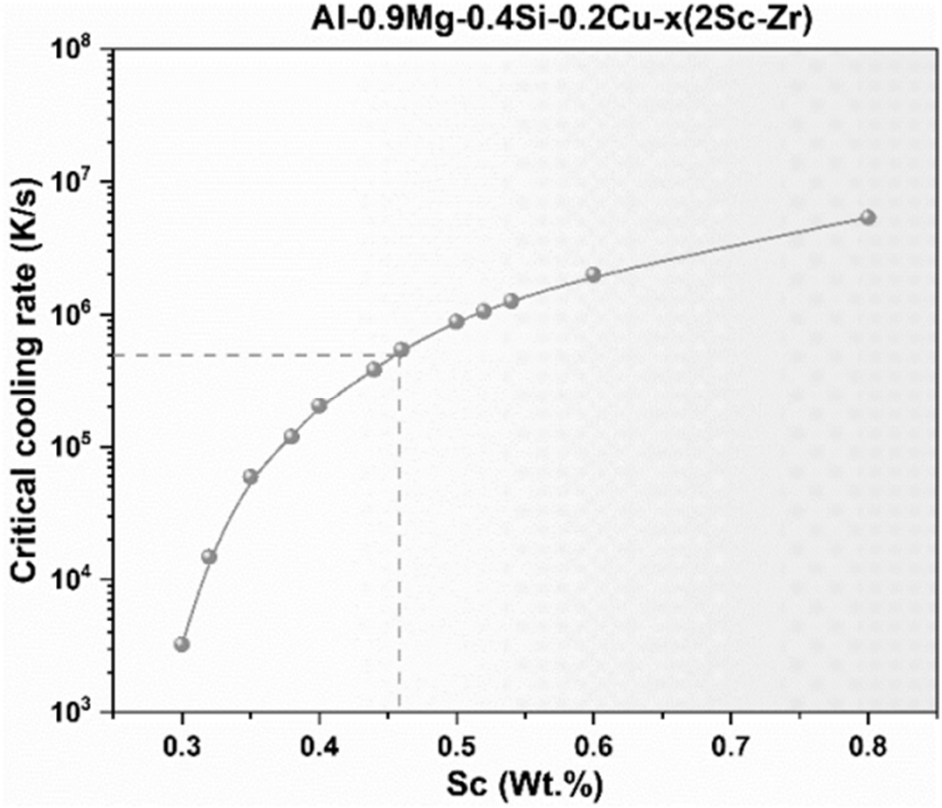

Al-0.9Mg-0.4Si-0.2Cu-x(2Sc-Zr)
Critical cooling rate (K/s)
10^8
10^7
10^6
10^5
10^4
10^3
0.3
0.4
0.5
0.6
0.7
0.8
Sc (Wt.%)

FIG. 3

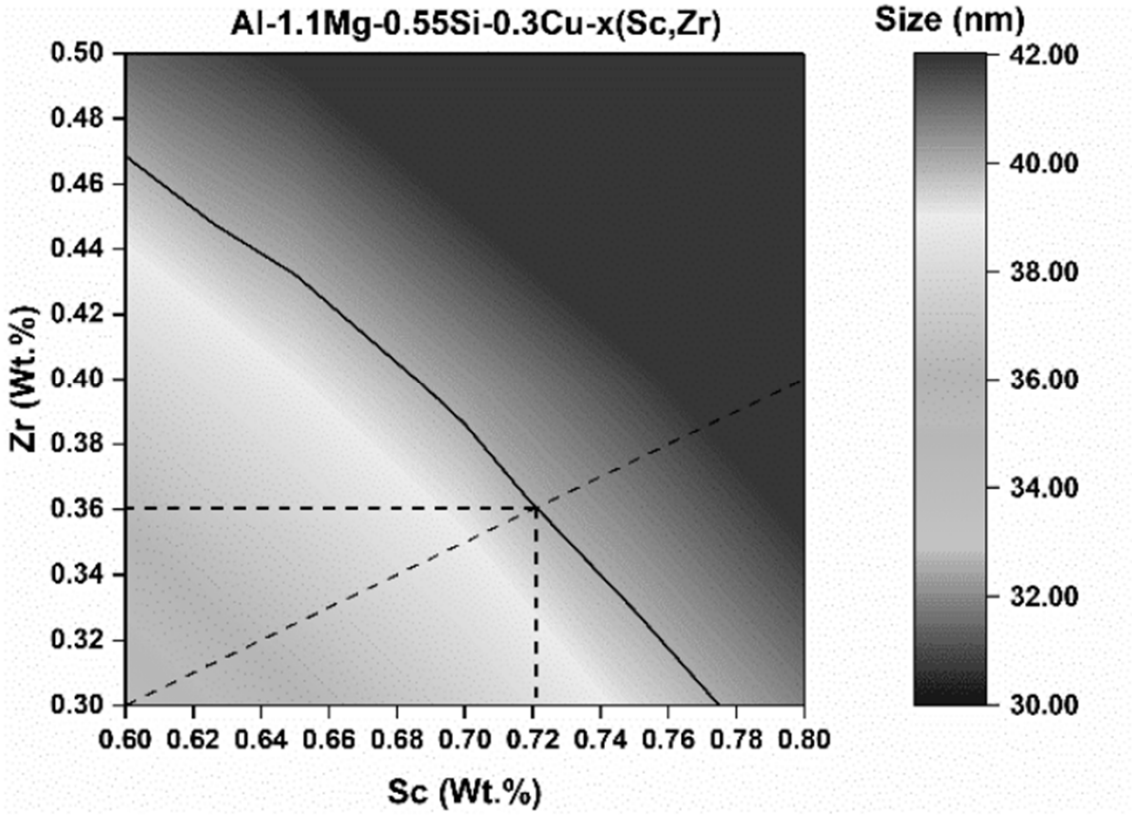

Al-1.1Mg-0.55Si-0.3Cu-x(Sc,Zr)
Size (nm)
42.00
40.00
38.00
36.00
34.00
32.00
30.00
Zr (Wt.%)
0.50
0.48
0.46
0.44
0.42
0.40
0.38
0.36
0.34
0.32
0.30
0.60 0.62 0.64 0.66 0.68 0.70 0.72 0.74 0.76 0.78 0.80
Sc (Wt.%)

FIG. 4

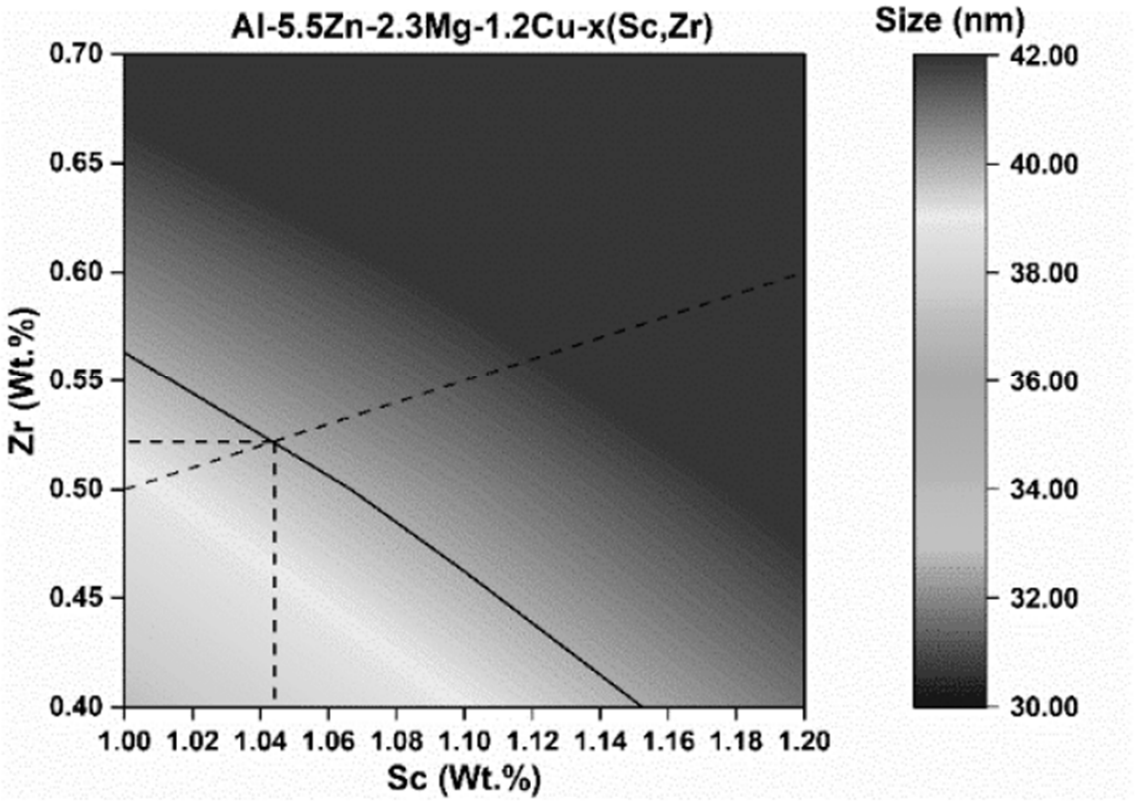

Al-5.5Zn-2.3Mg-1.2Cu-x(Sc,Zr)
Size (nm)
42.00
40.00
38.00
36.00
34.00
32.00
30.00
Zr (Wt.%)
0.70
0.65
0.60
0.55
0.50
0.45
0.40
1.00 1.02 1.04 1.06 1.08 1.10 1.12 1.14 1.16 1.18 1.20
Sc (Wt.%)

FIG. 5

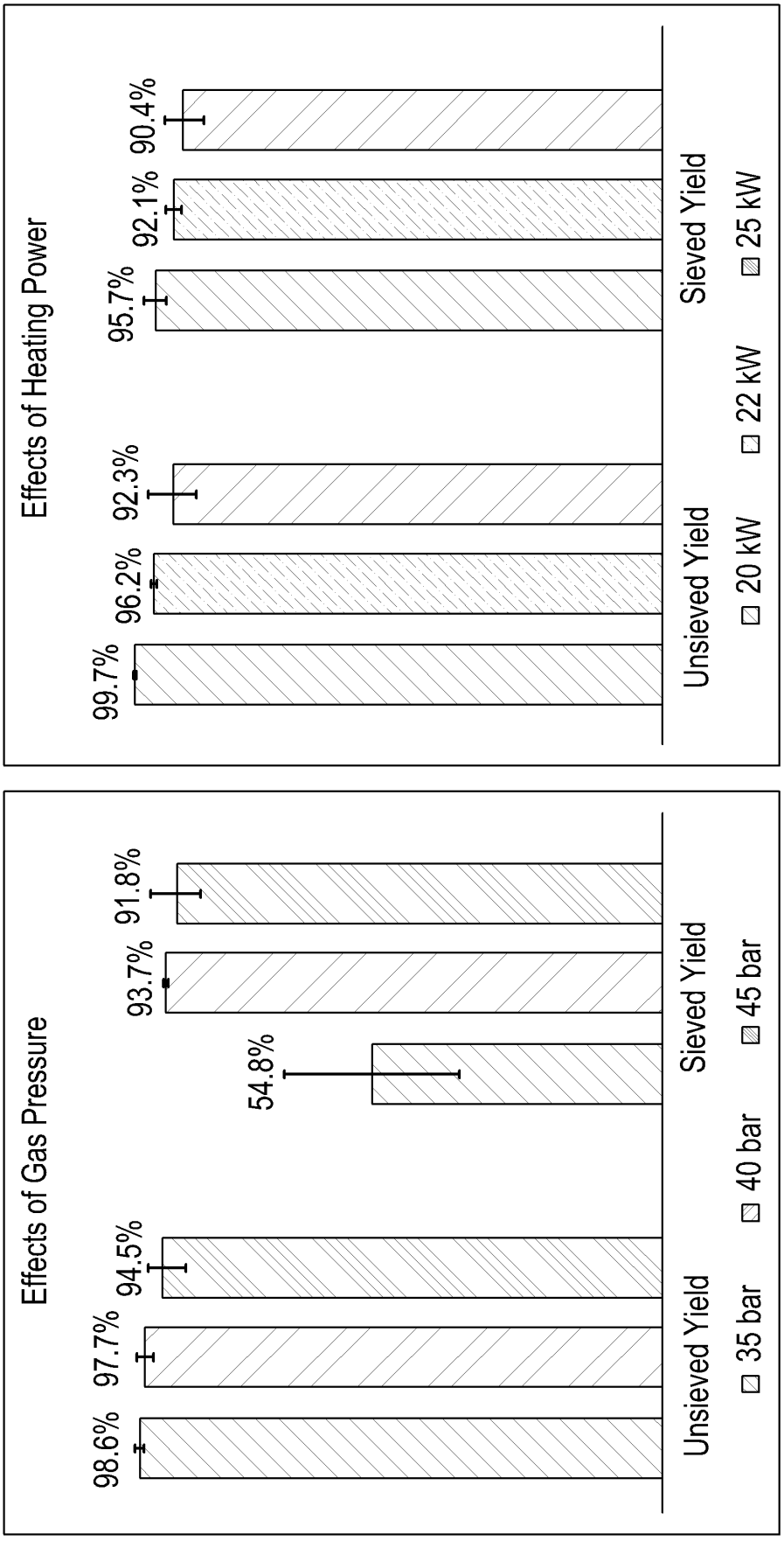

Effects of Gas Pressure
98.6%
97.7%
94.5%
54.8%
93.7%
91.8%
Unsieved Yield
Sieved Yield
35 bar
40 bar
45 bar
(a)
Effects of Heating Power
99.7%
96.2%
92.3%
95.7%
92.1%
90.4%
Unsieved Yield
Sieved Yield
20 kW
22 kW
25 kW
(b)

FIG. 6

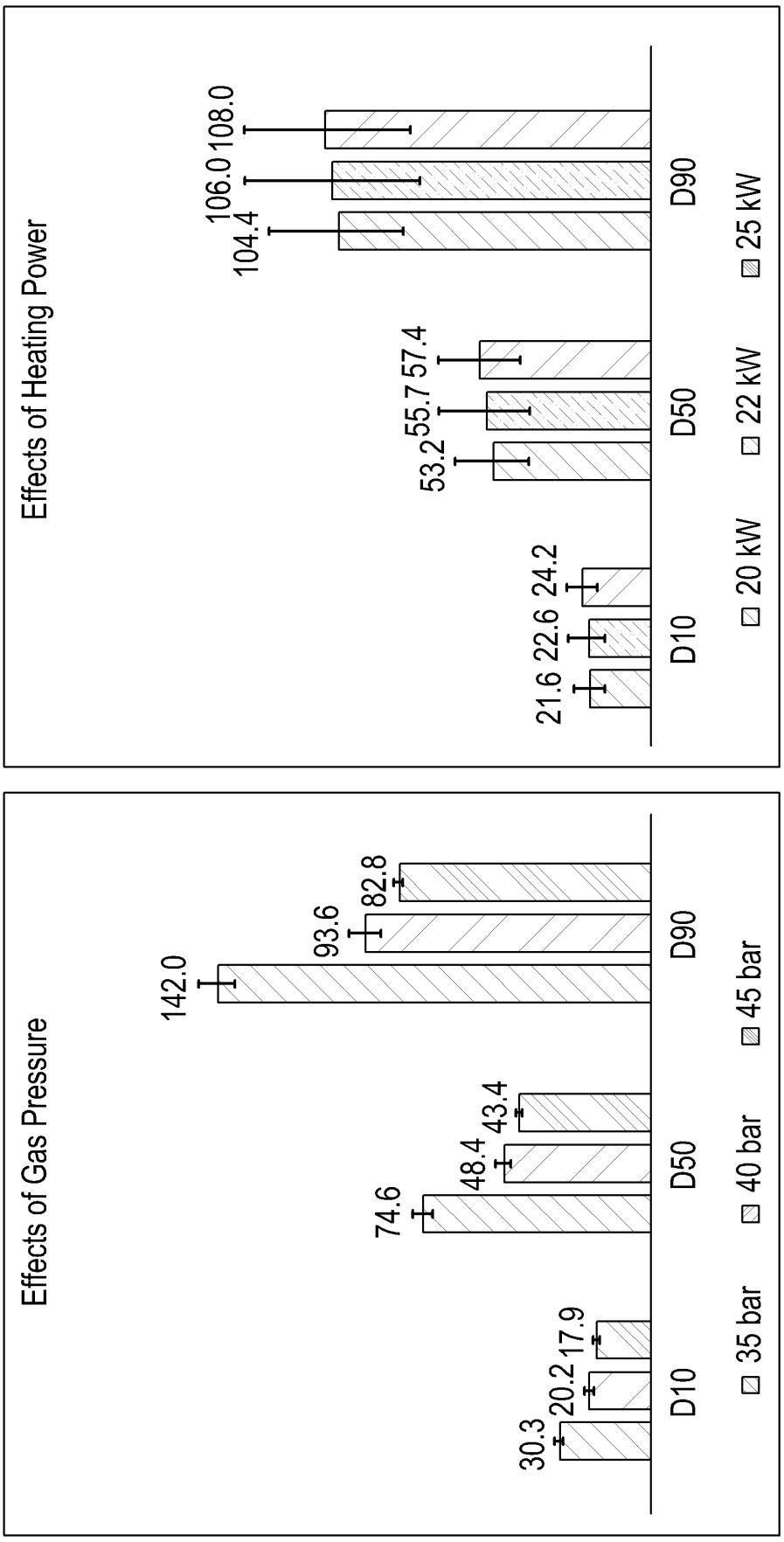
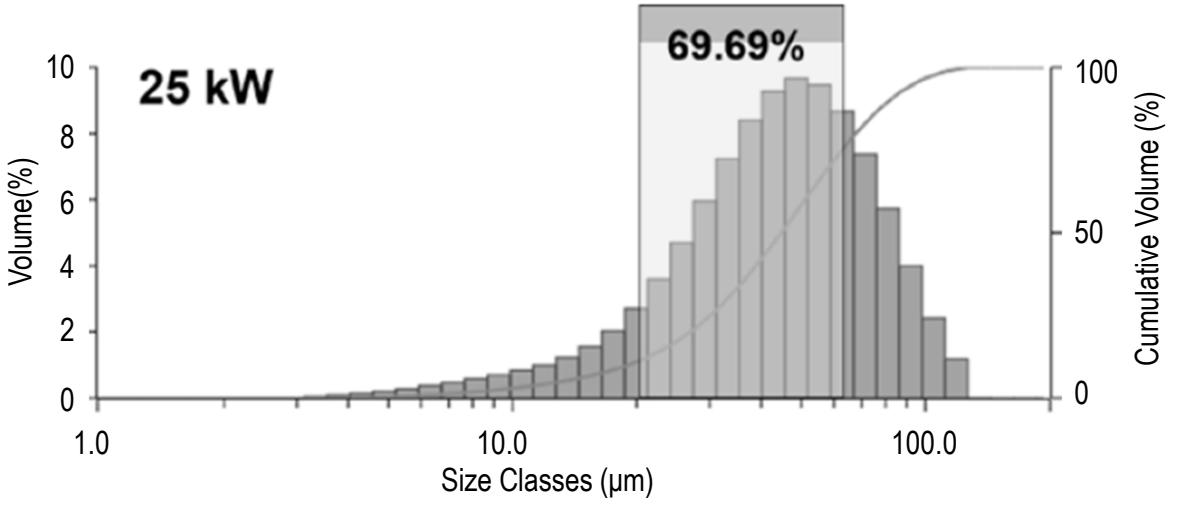
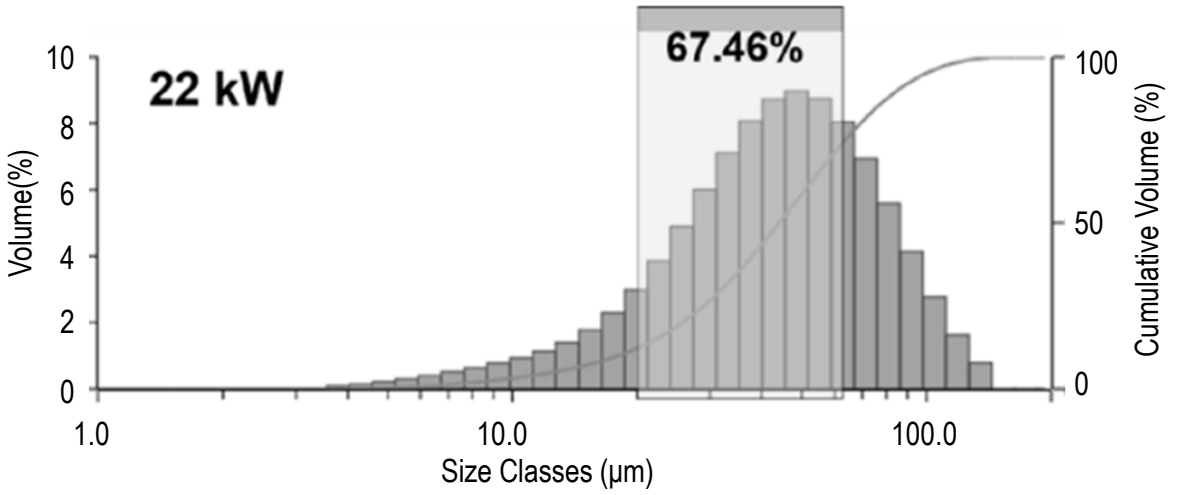

Effects of Gas Pressure
142.0
93.6
82.8
74.6
48.4
43.4
30.3
20.2
17.9
D10
D50
D90
35 bar
40 bar
45 bar
(a)
Effects of Heating Power
106.0
108.0
104.4
55.7
57.4
53.2
21.6
22.6
24.2
D10
D50
D90
20 kW
22 kW
25 kW
(b)

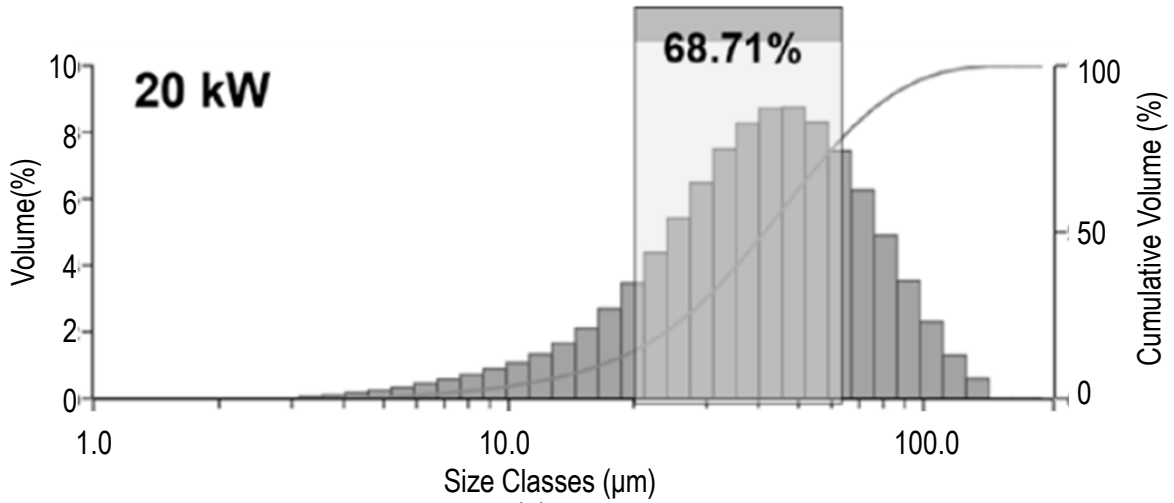
FIG. 7


25 kW
69.69%
Volume(%)
Cumulative Volume (%)
Size Classes (μm)
1.0
10.0
100.0
0
2
4
6
8
10
0
50
100

(a)


22 kW
67.46%
Volume(%)
Cumulative Volume (%)
Size Classes (μm)
1.0
10.0
100.0
0
2
4
6
8
10
0
50
100

(b)


20 kW
68.71%
Volume(%)
Cumulative Volume (%)
Size Classes (μm)
1.0
10.0
100.0
0
2
4
6
8
10
0
50
100

(c)

FIG. 8

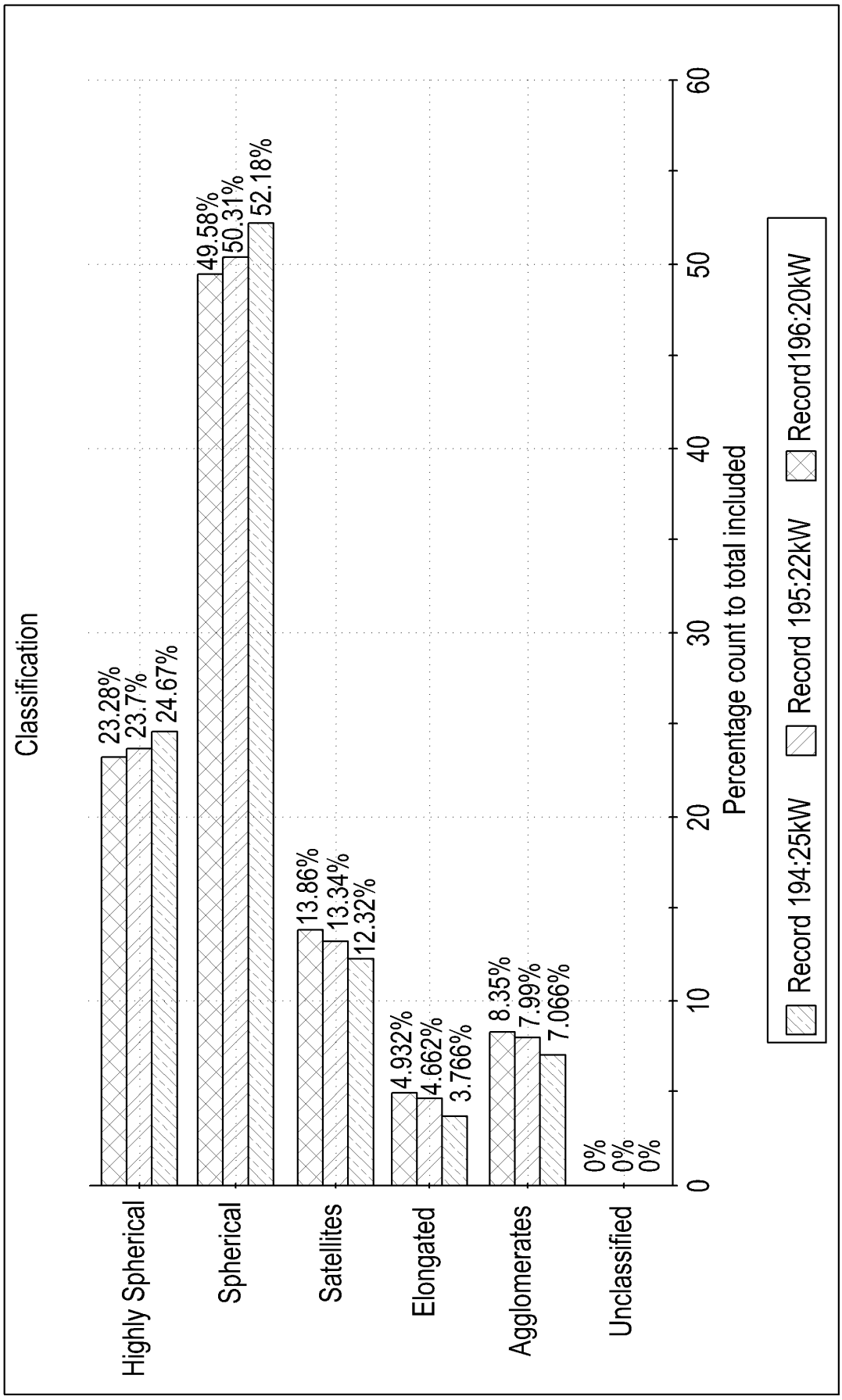

Classification
Highly Spherical
Spherical
Satellites
Elongated
Agglomerates
Unclassified
23.28%
23.7%
24.67%
49.58%
50.31%
52.18%
13.86%
13.34%
12.32%
4.932%
4.662%
3.766%
8.35%
7.99%
7.066%
0%
0%
0%
0
10
20
30
40
50
60
Percentage count to total included
Record 194:25kW
Record 195:22kW
Record196:20kW

FIG. 9

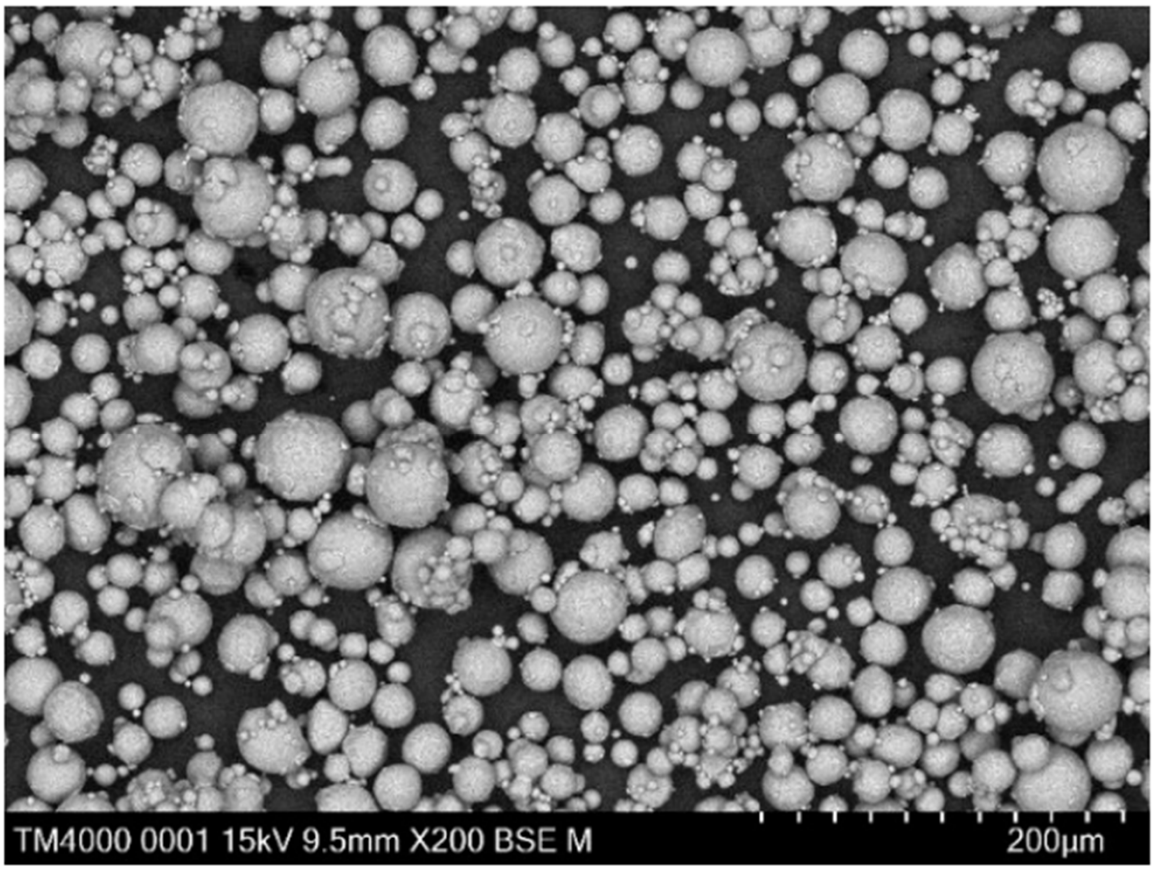


FIG. 10

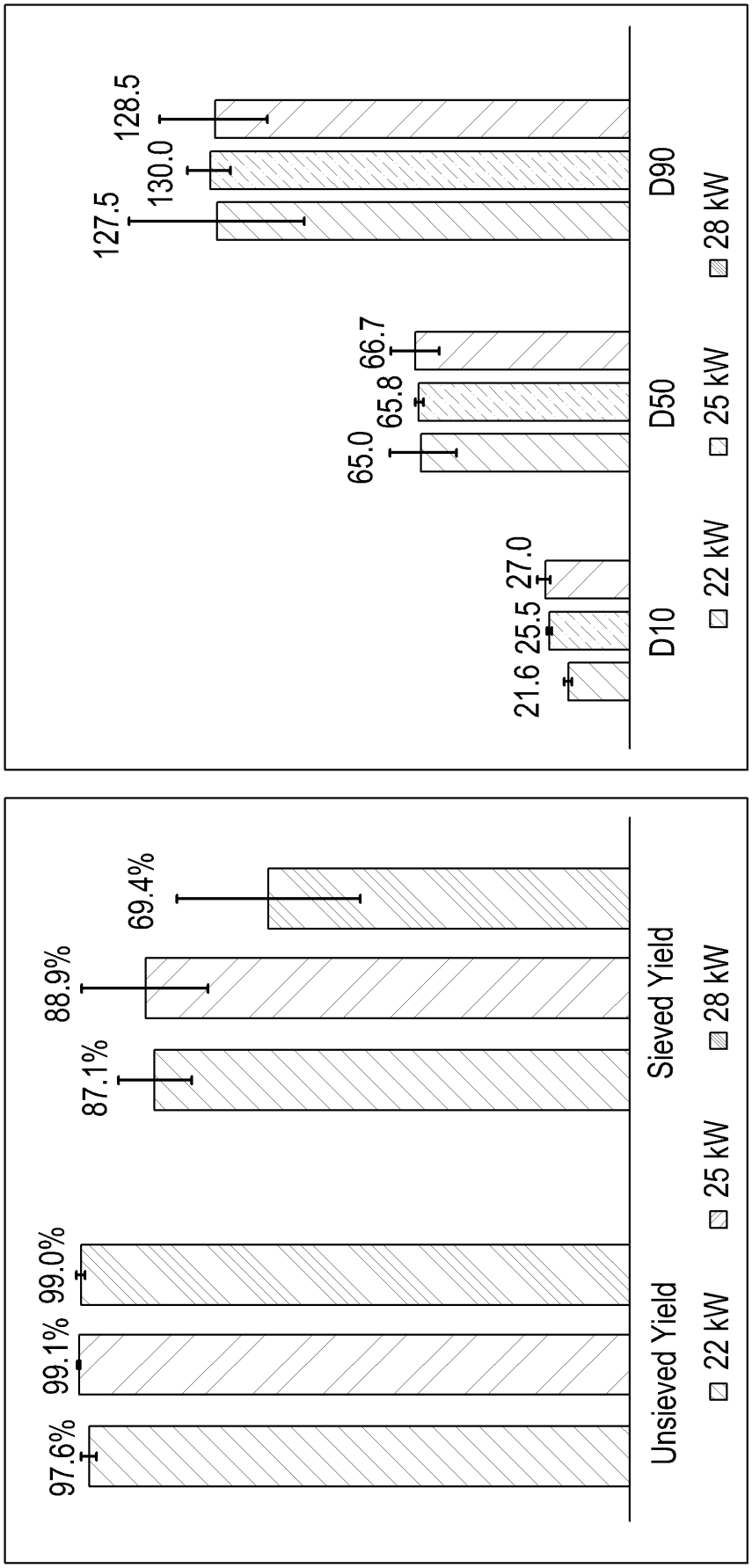
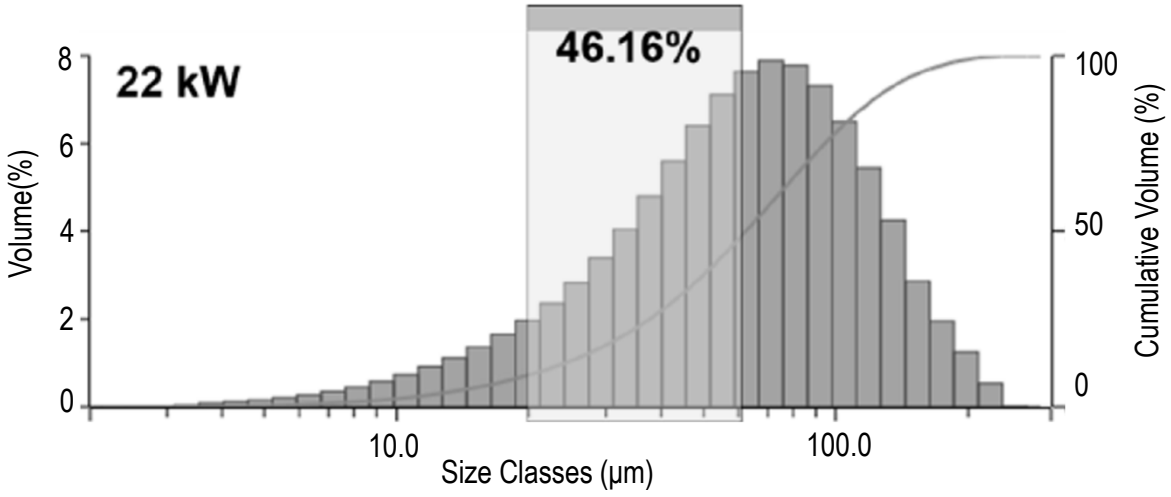
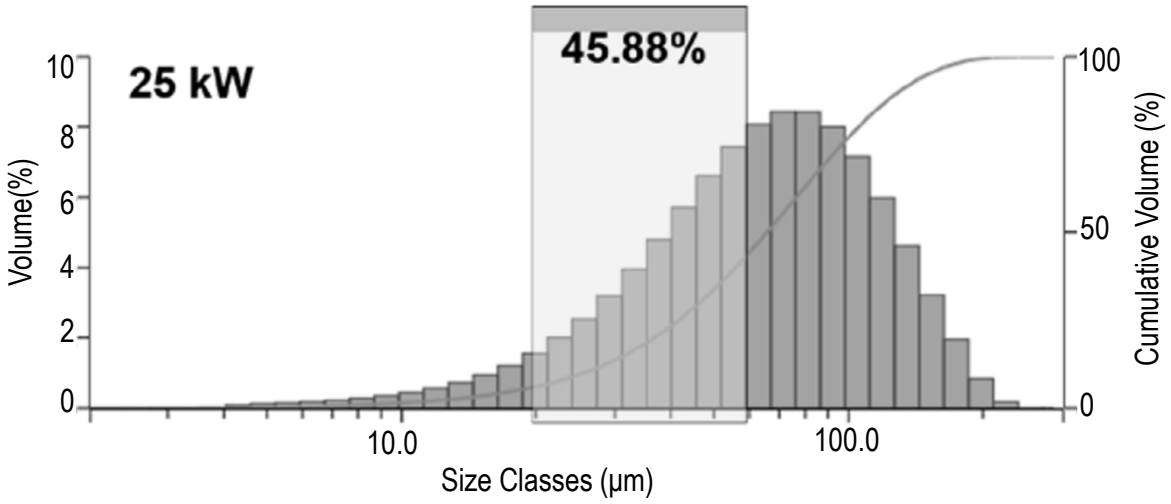

97.6%
99.1%
99.0%
87.1%
88.9%
69.4%
Unsieved Yield
Sieved Yield
22 kW
25 kW
28 kW
(a)
21.6
25.5
27.0
65.0
65.8
66.7
127.5
130.0
128.5
D10
D50
D90
22 kW
25 kW
28 kW
(b)

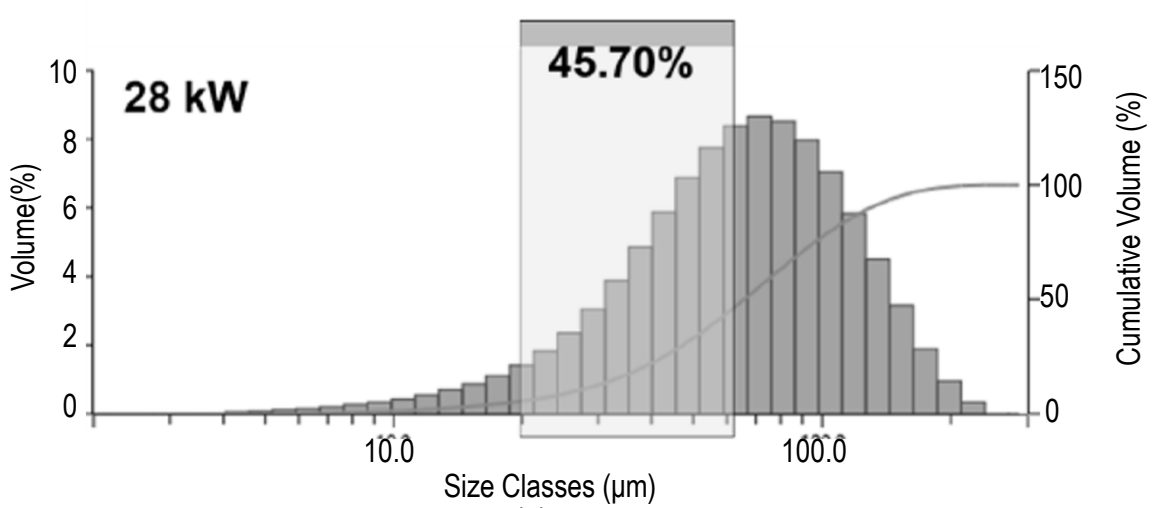
FIG. 11


22 kW
46.16%
Volume(%)
Cumulative Volume (%)
Size Classes (μm)
10.0
100.0
0
2
4
6
8
50
100

(a)


25 kW
45.88%
Volume(%)
Cumulative Volume (%)
Size Classes (μm)
10.0
100.0
0
2
4
6
8
10
50
100

(b)


28 kW
45.70%
Volume(%)
Cumulative Volume (%)
Size Classes (μm)
10.0
100.0
0
2
4
6
8
10
50
100
150

(c)

FIG. 12

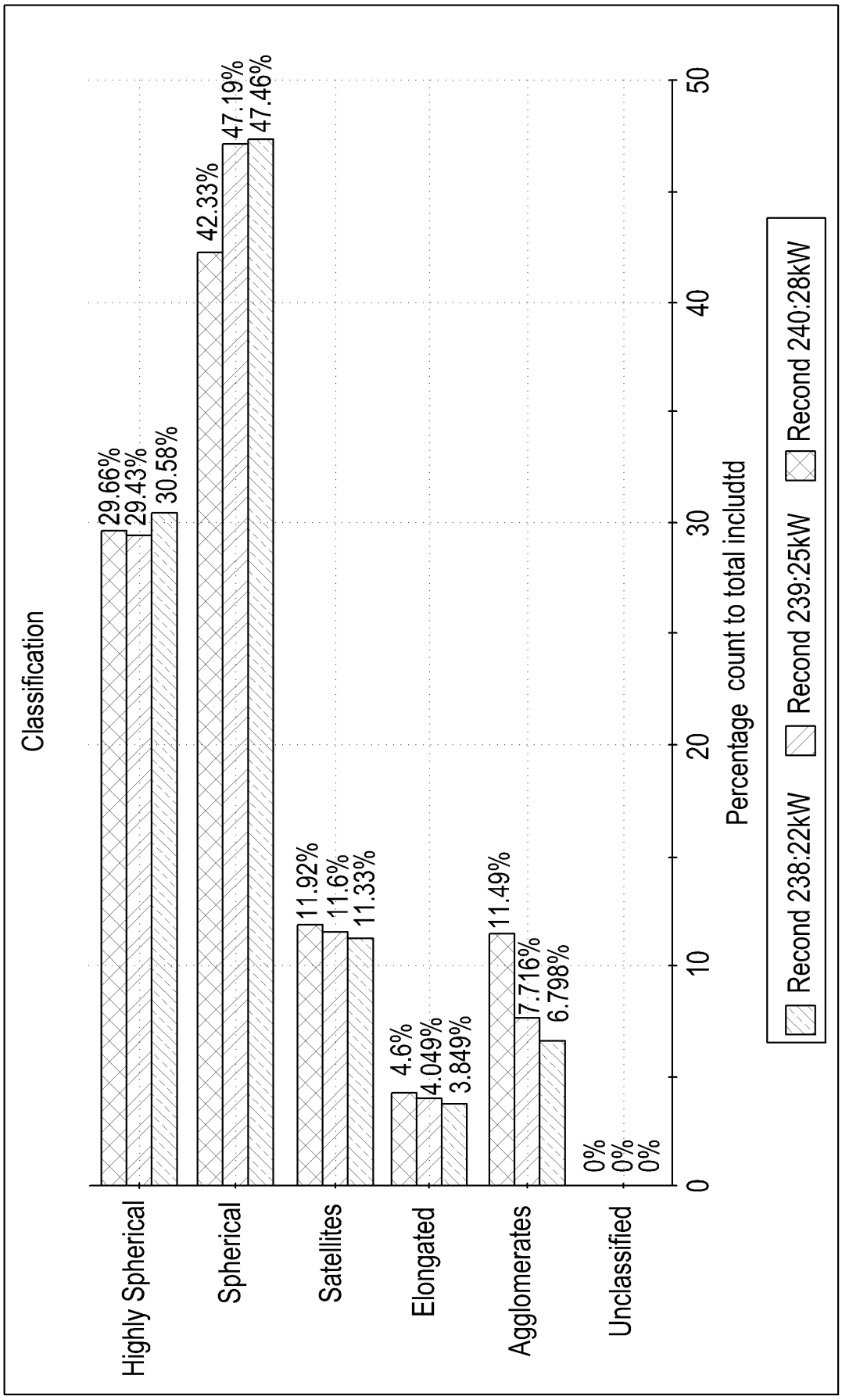

Classification
Highly Spherical
Spherical
Satellites
Elongated
Agglomerates
Unclassified
29.66%
29.43%
30.58%
42.33%
47.19%
47.46%
11.92%
11.6%
11.33%
4.6%
4.049%
3.849%
11.49%
7.716%
6.798%
0%
0%
0%
0
10
20
30
40
50
Percentage count to total includtd
Recond 238:22kW
Recond 239:25kW
Recond 240:28kW

FIG. 13

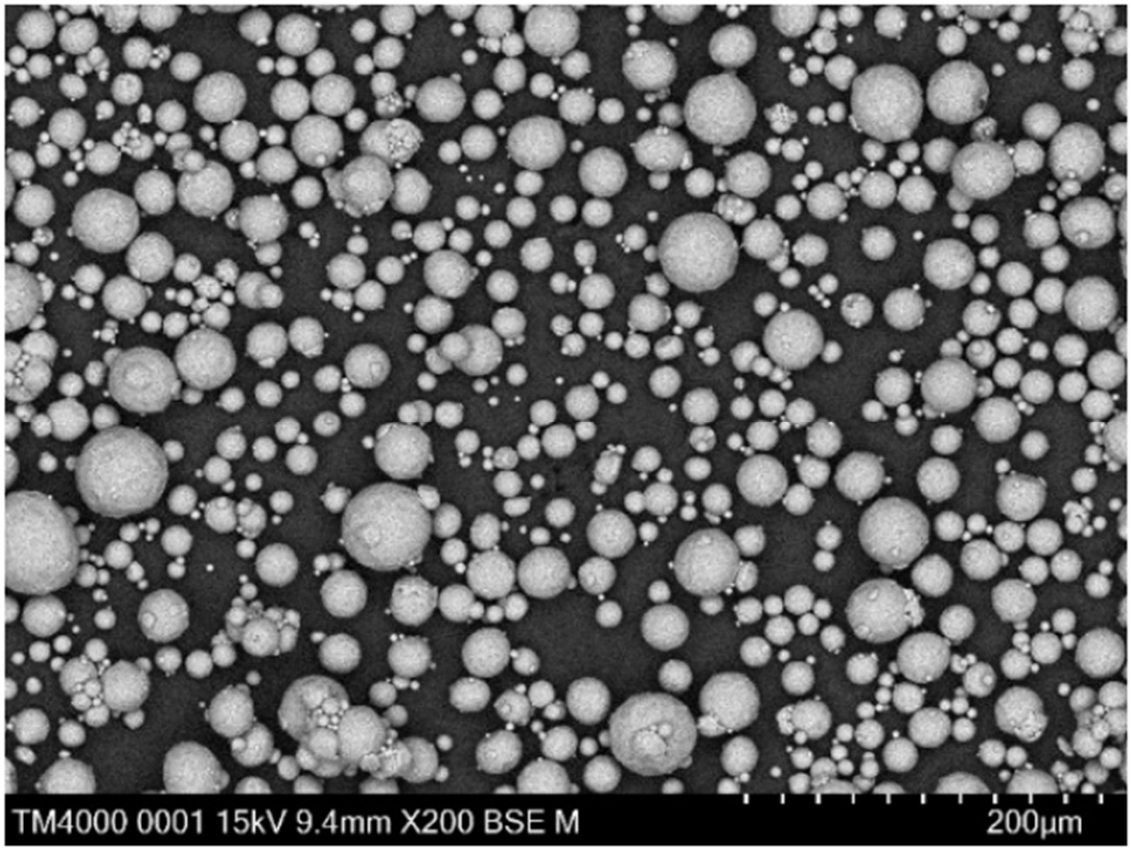


FIG. 14

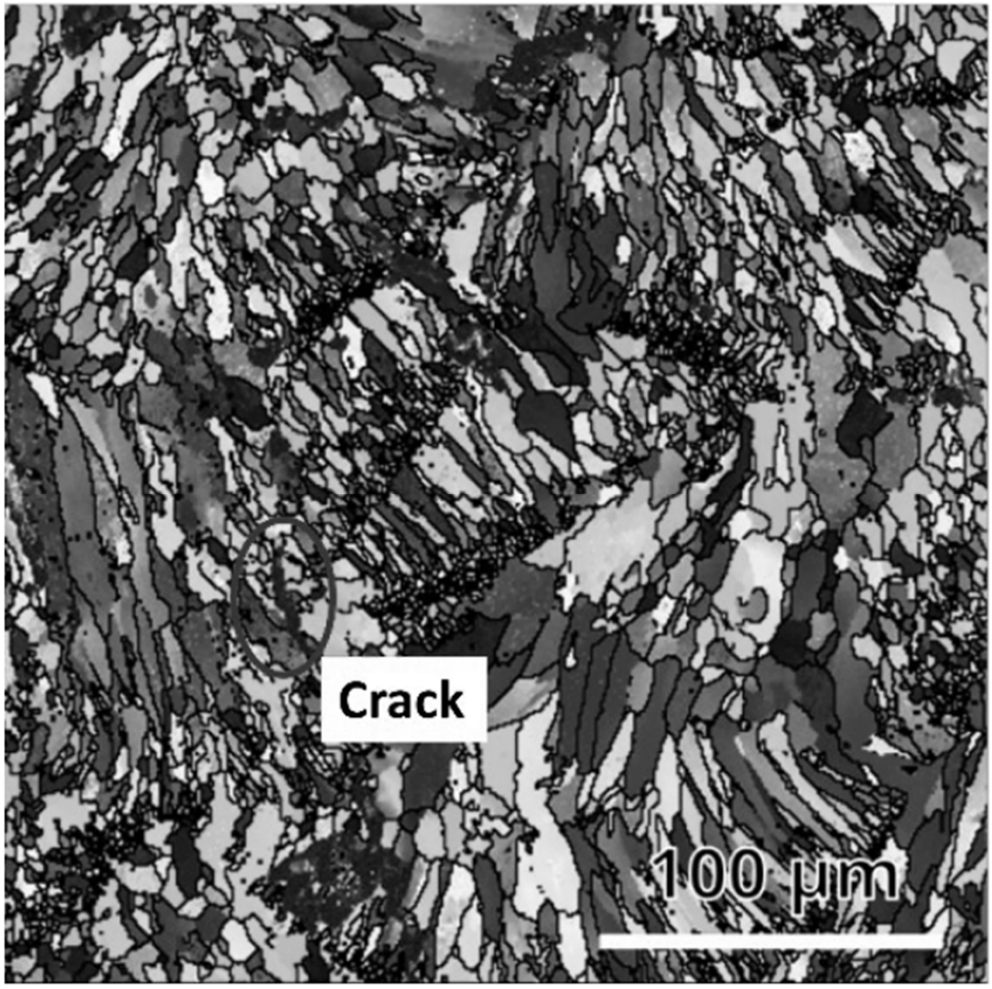


FIG. 15

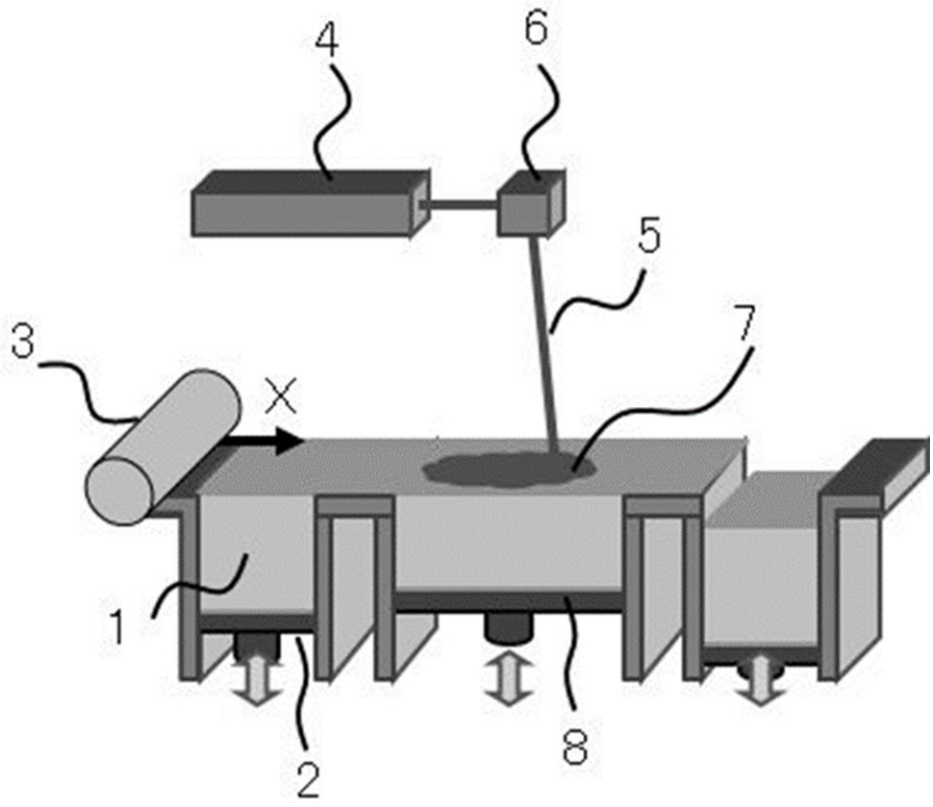


FIG. 16

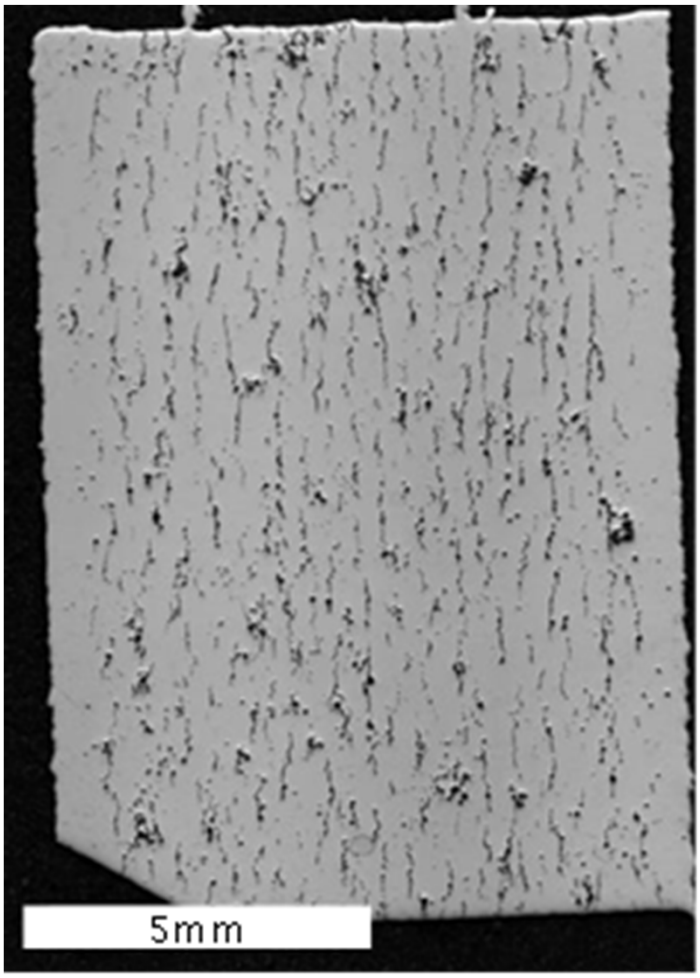


FIG. 17

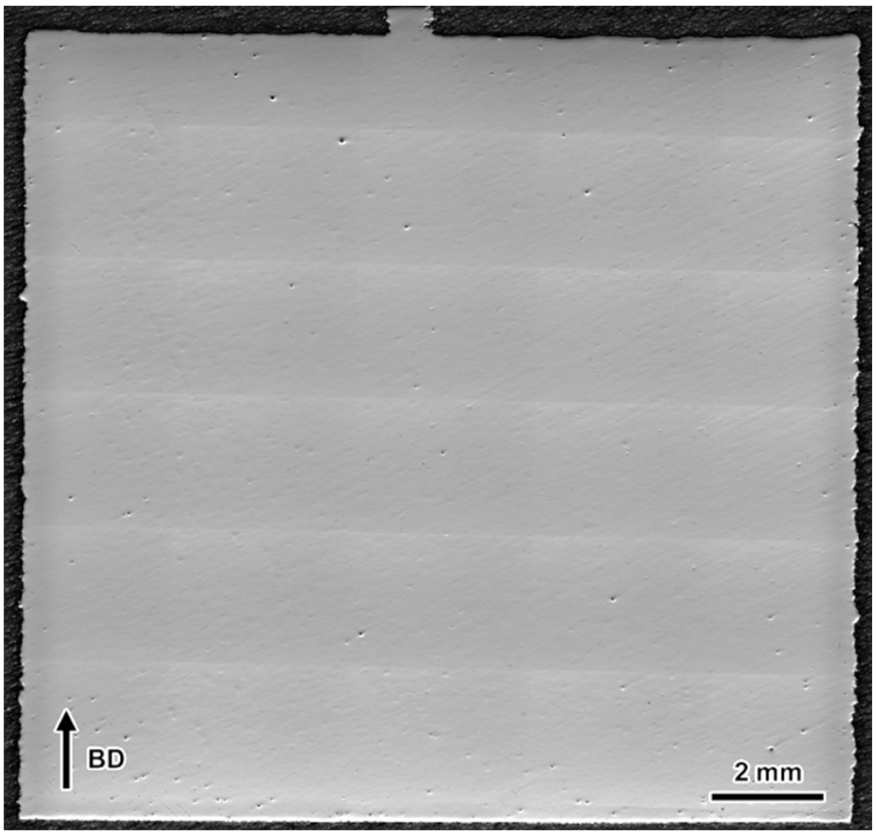


FIG. 18

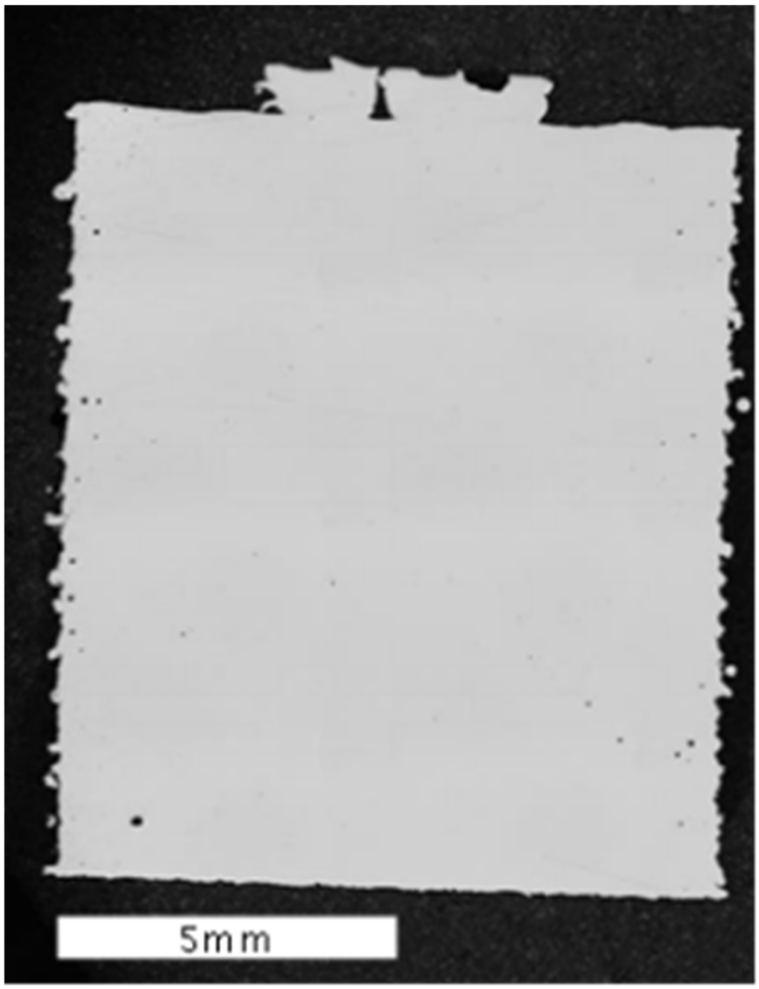


FIG. 19

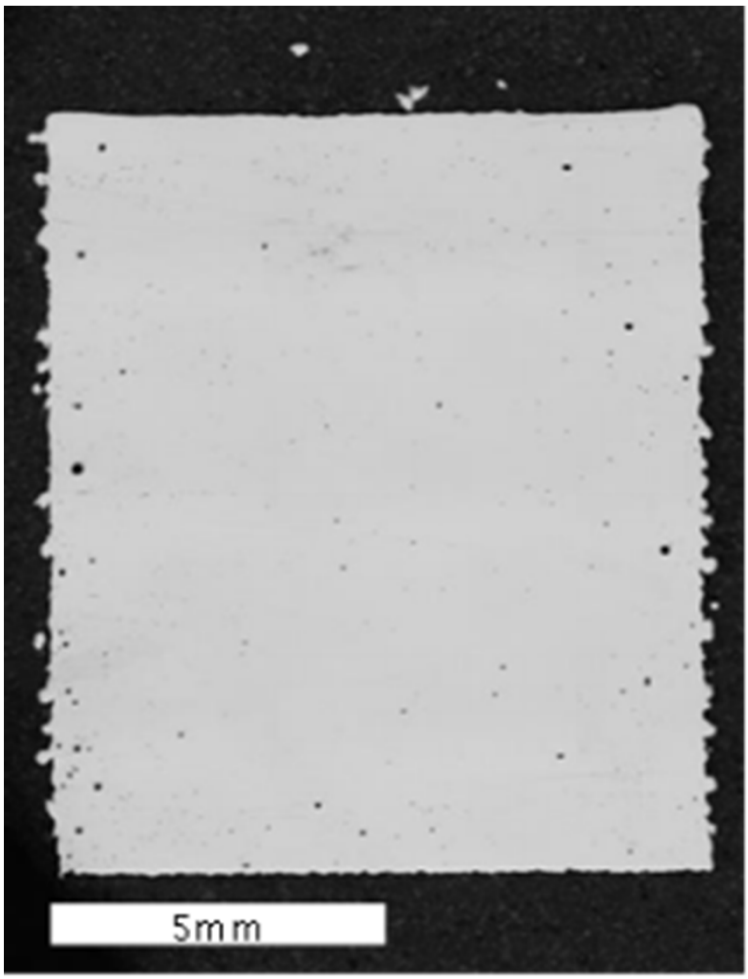


FIG. 20



FIG. 21

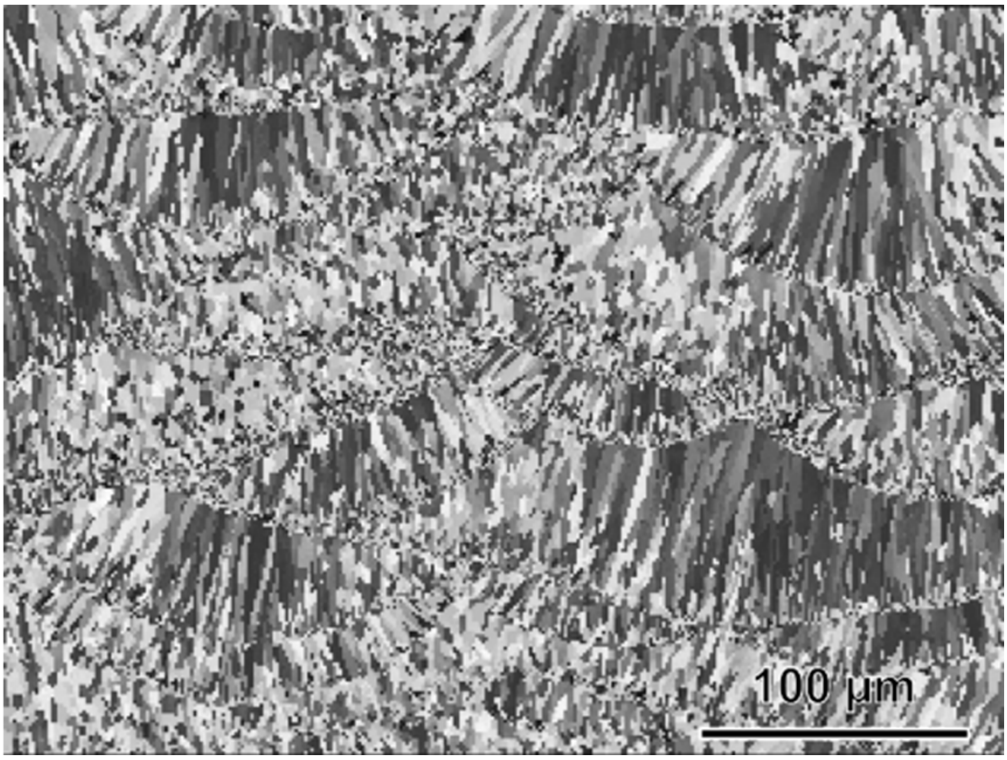


FIG. 22

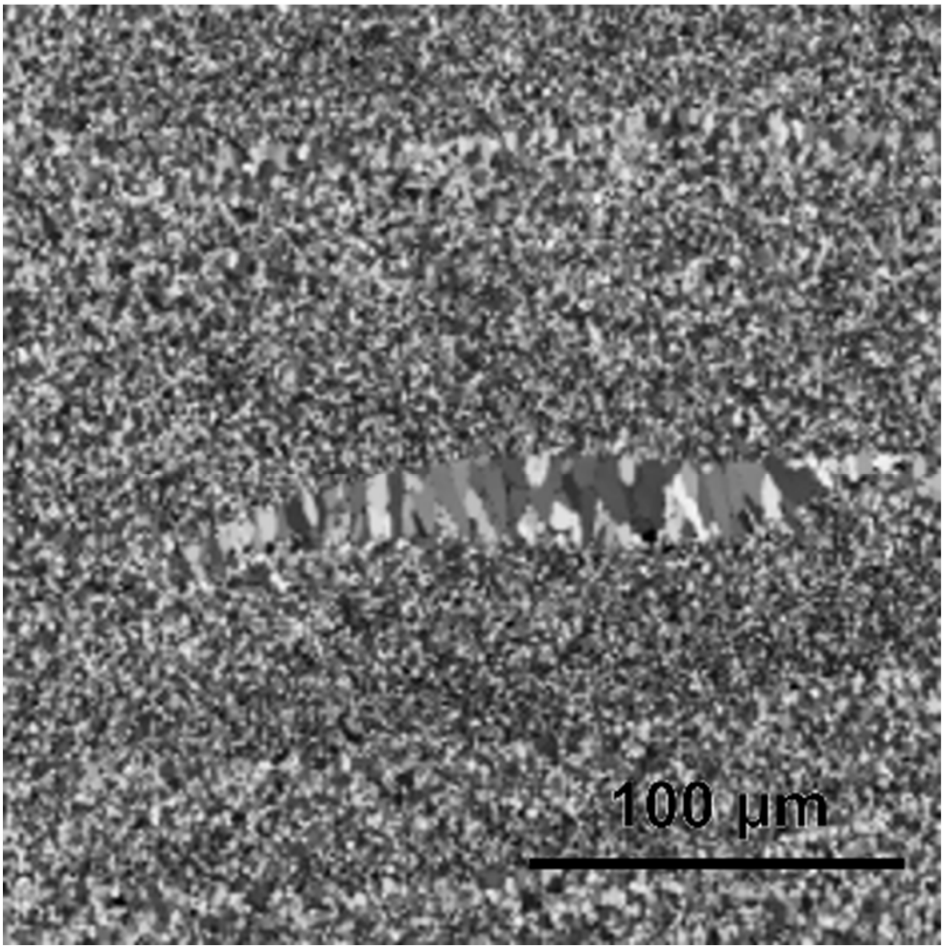


FIG. 23

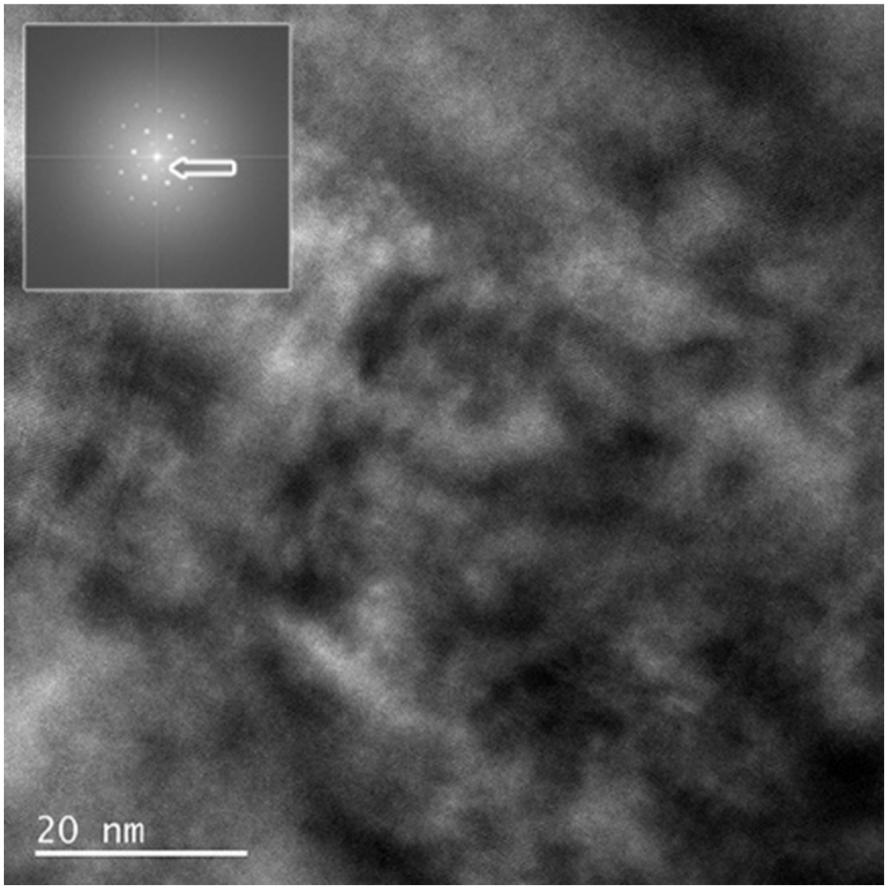


FIG. 24

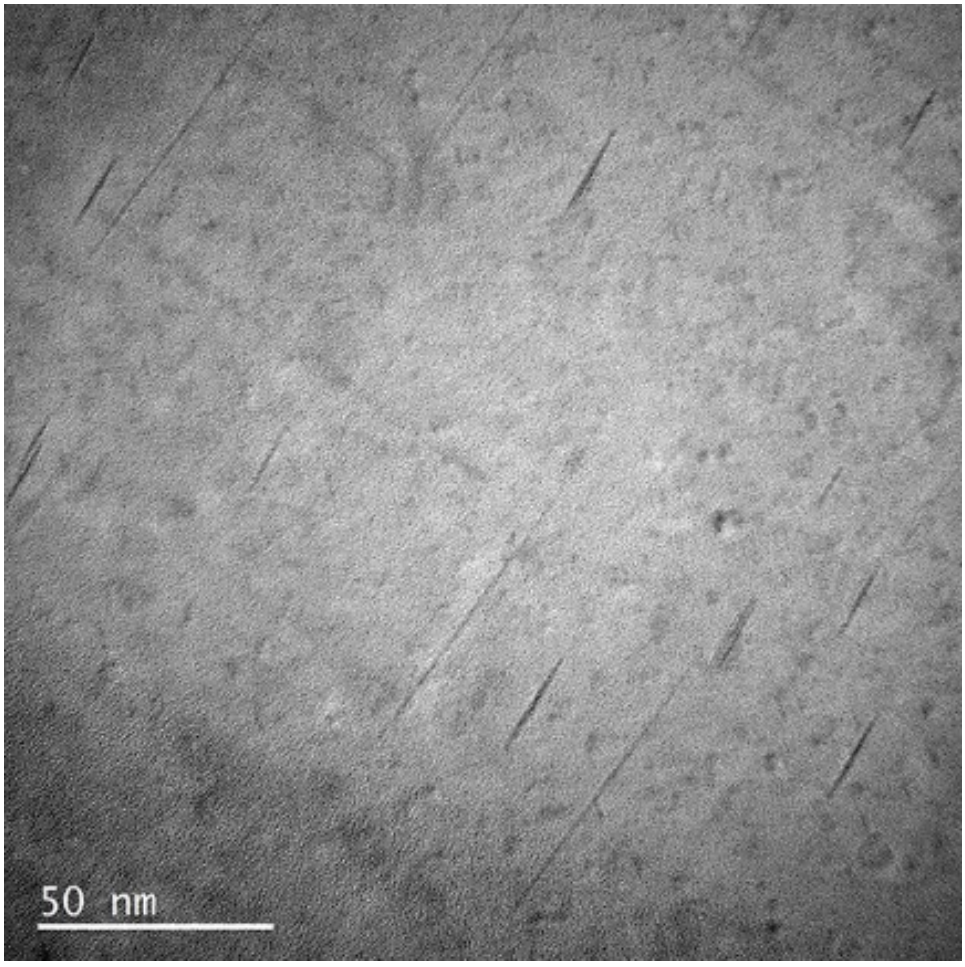


FIG. 25