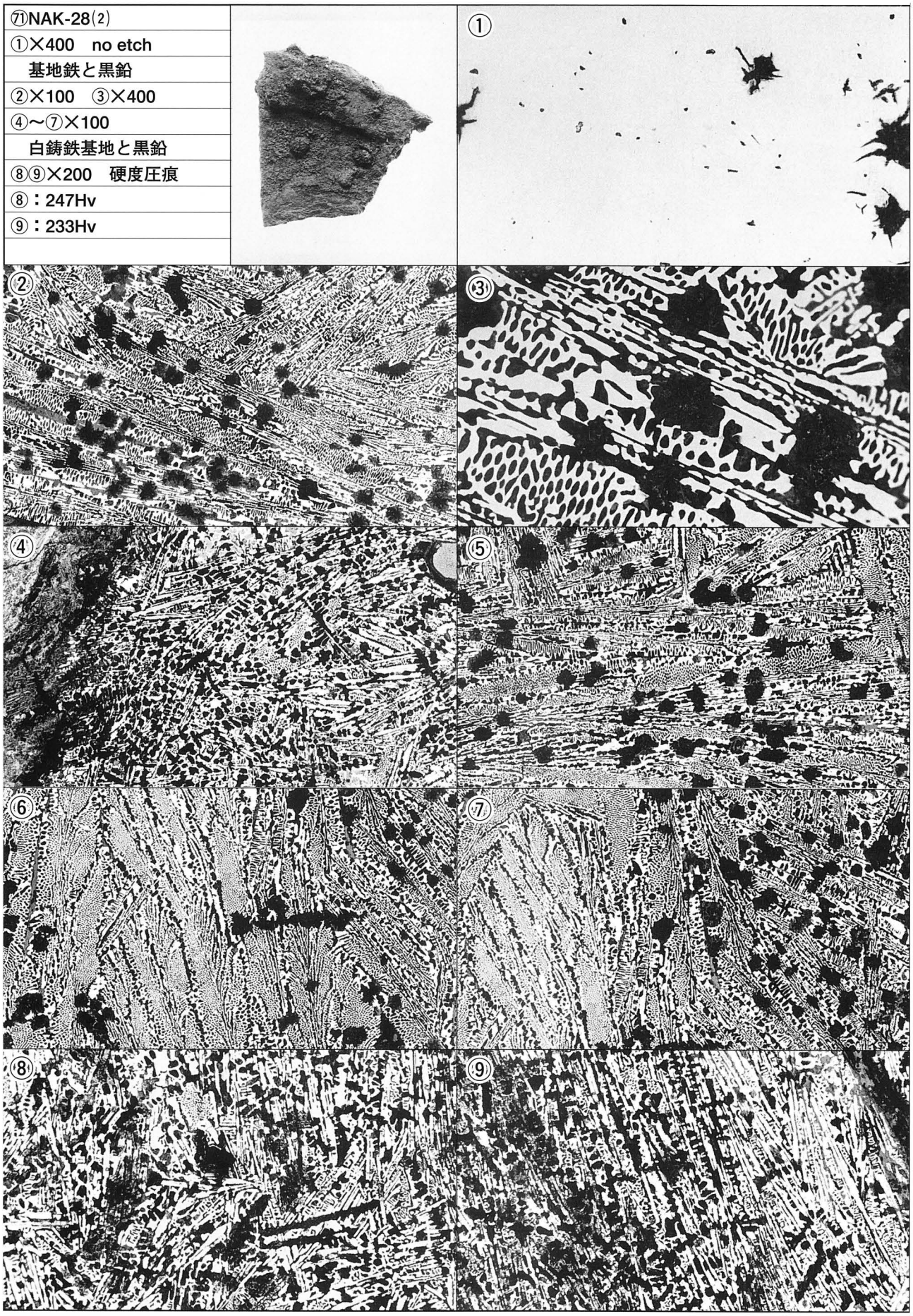
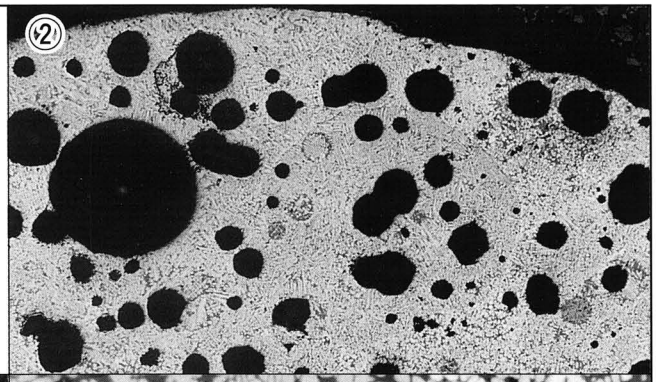


Photo.36　鉄鍋の顕微鏡組織

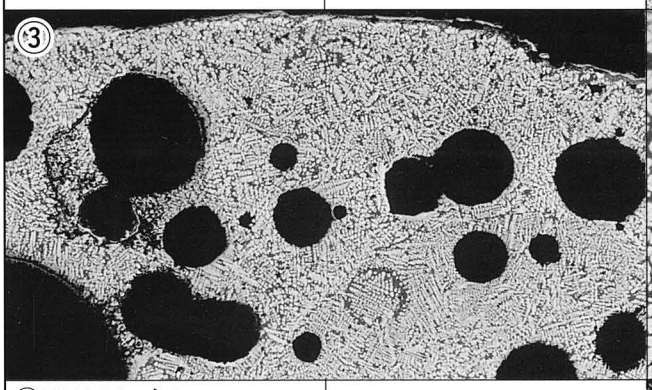
⑫NAK-29-イ-1
粒状滓
4.5mm径　磁着強
①×3　外観写真
⑨×20　マクロ組織
②×50　③×100　④×400
ヴスタイト

①

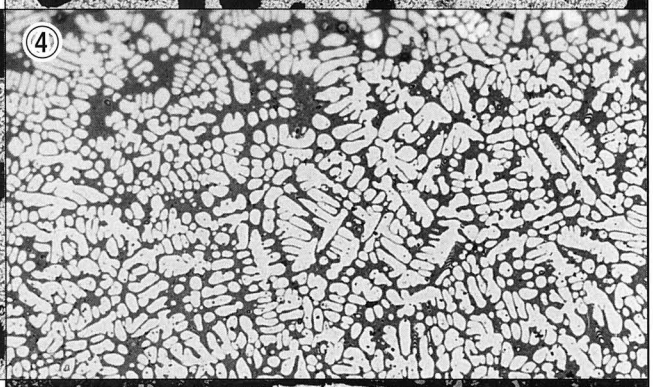
②



③



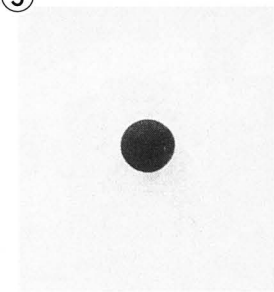
④



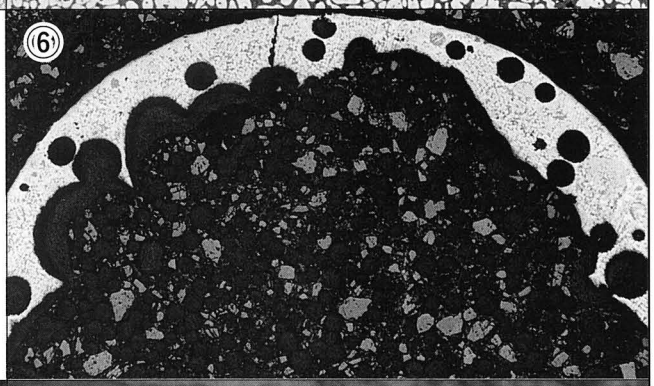
⑬NAK-29-イ-2
粒状滓
2.5mm径　磁着強

⑤×3　外観写真
⑩×20　マクロ組織
⑥×50　⑦×100　⑧×400
ウルボスピネル
or マグネタイト？

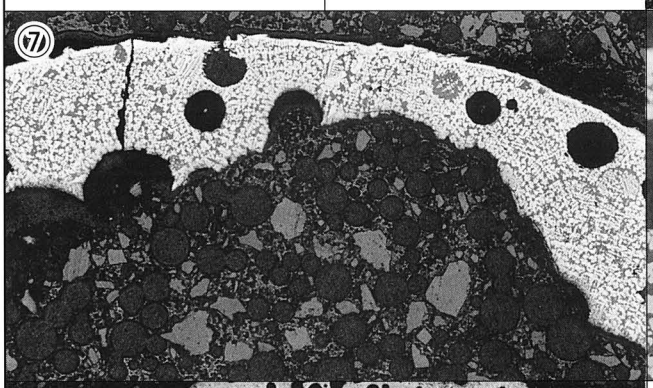
⑤



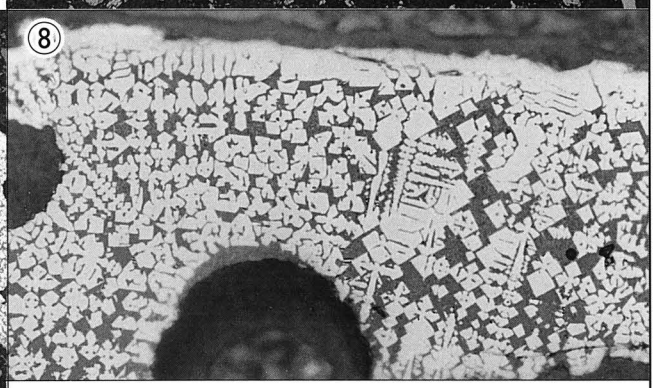
⑥



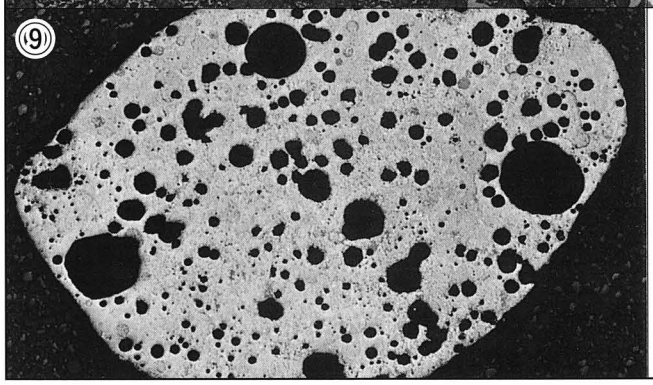
⑦



⑧



⑨



⑩

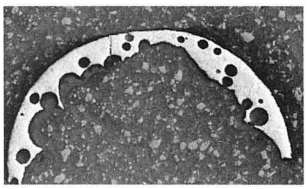
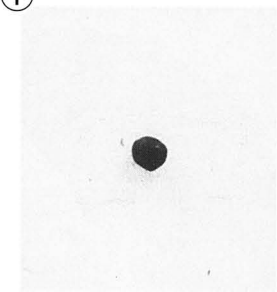
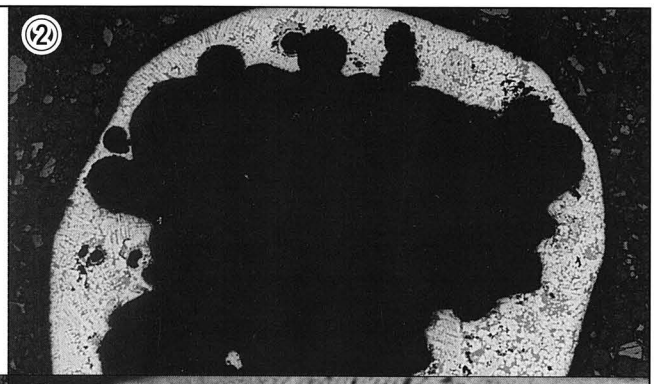
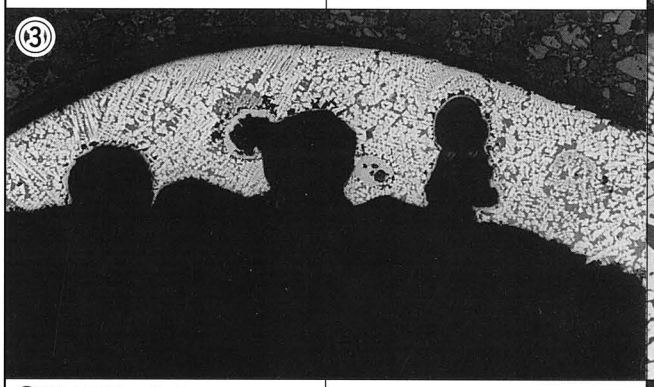


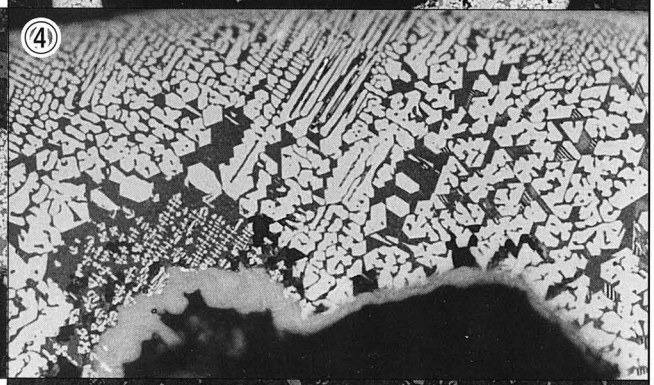
Photo.37　粒状滓の顕微鏡組織

⑭NAK-29-イ-3
粒状滓
1.5mm径　磁着強
①×3　外観写真
⑨×20　マクロ組織
②×50　③×100　④×400
ウルボスピネル



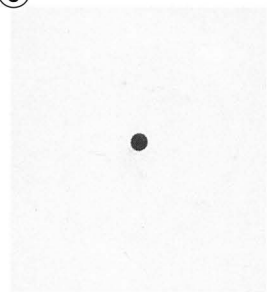


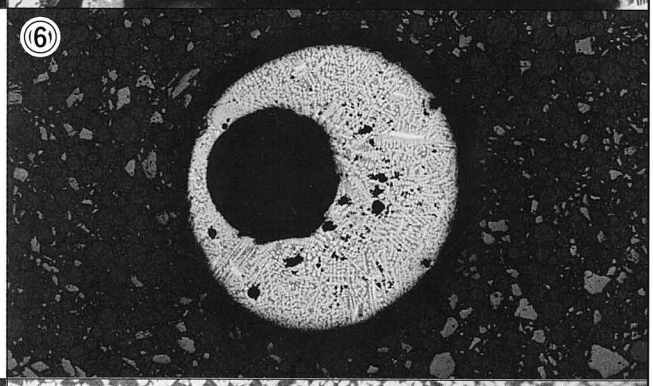


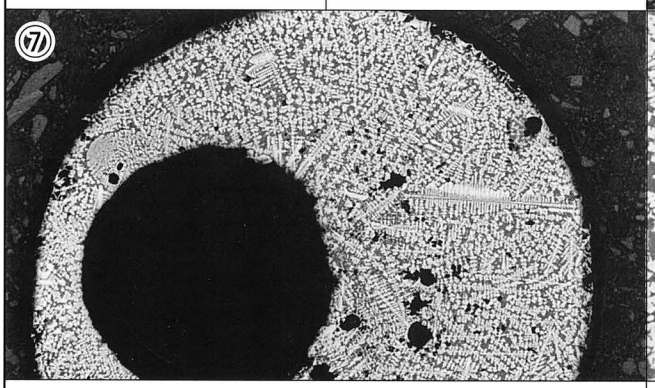


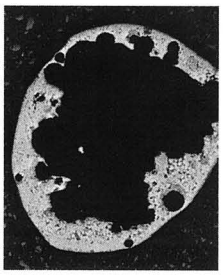
⑮NAK-29-イ-4
粒状滓
0.8mm径　磁着強

⑤×3　外観写真
⑩×20　マクロ組織
⑥×50　⑦×100　⑧×400
ウルボスピネル
or マグネタイト？









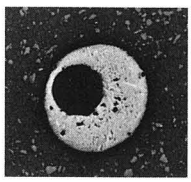
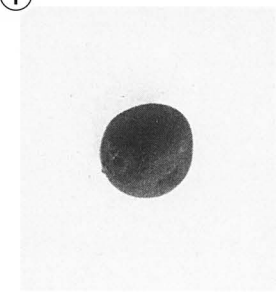


Photo.38　粒状滓の顕微鏡組織

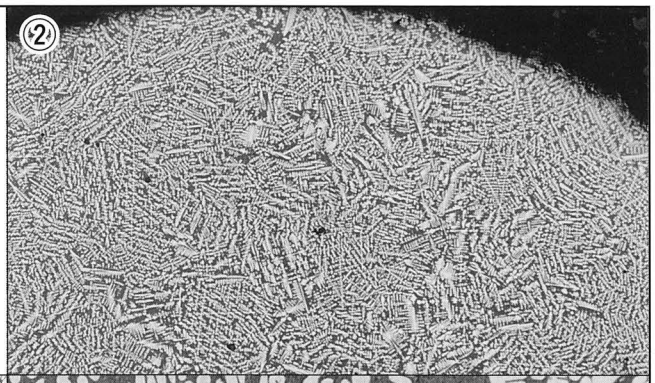
⑦⑦NAK-29-ロ-1
粒状滓
4.4mm径　磁着弱

①×3　外観写真
⑨×20　マクロ組織（0.79）
②×50　③×100　④×400
ヴスタイト

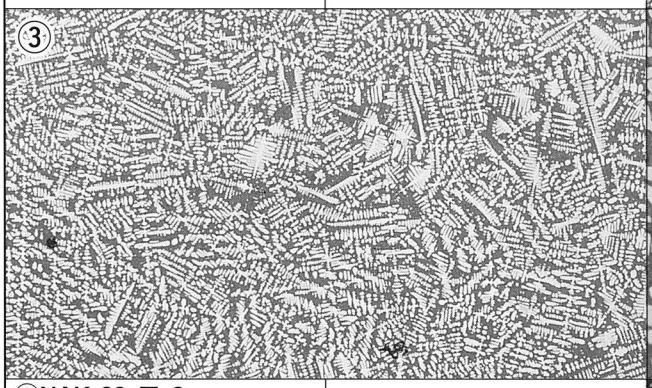
①



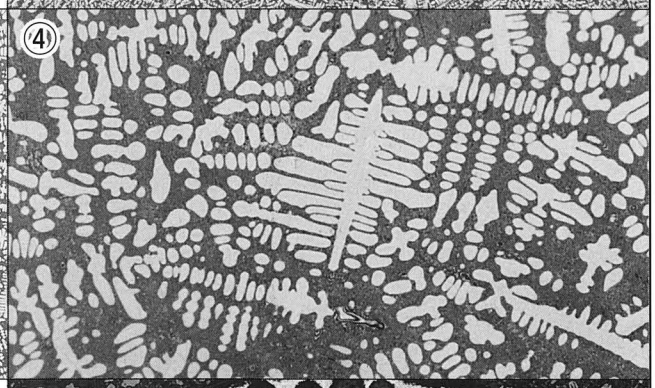
②



③



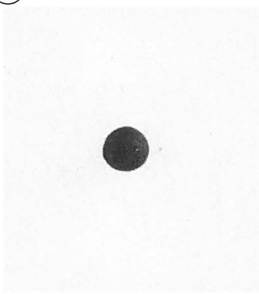
④



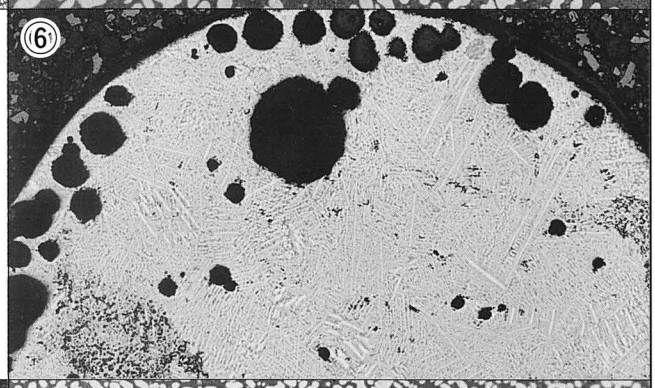
⑦⑦NAK-29-ロ-2
粒状滓
2.4mm径　磁着弱

⑤×3　外観写真
⑩×20　マクロ組織（0.82）
⑥×50　⑦×100　⑧×400
ヴスタイト

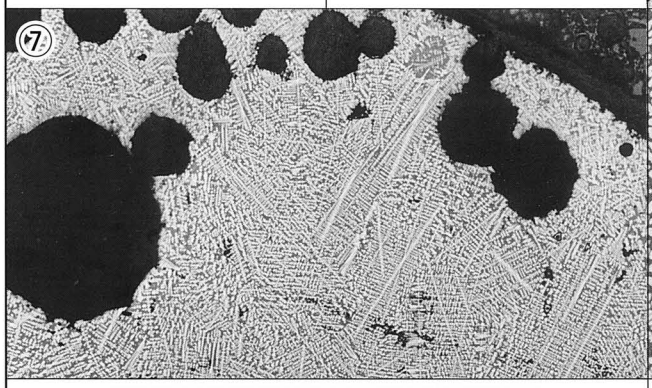
⑤



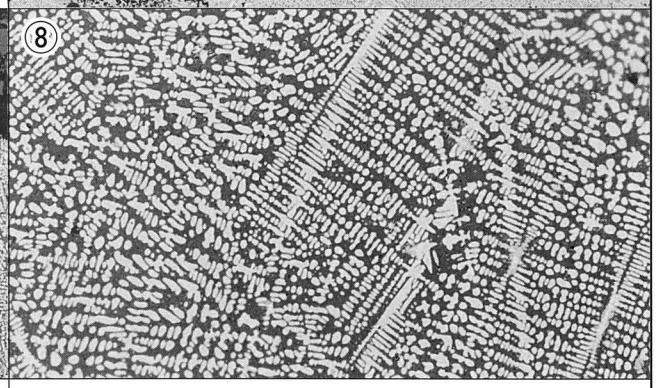
⑥



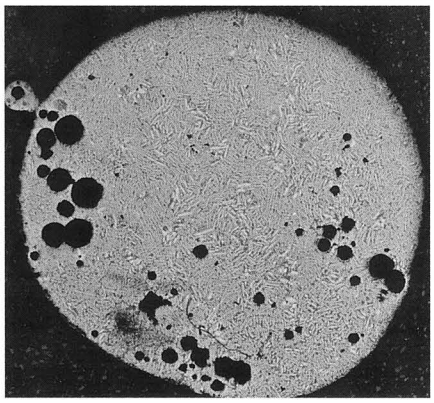
⑦



⑧



⑨



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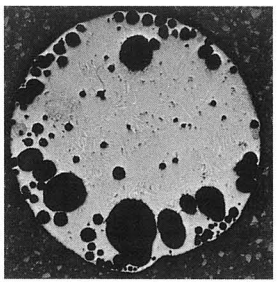


Photo.39　粒状滓の顕微鏡組織

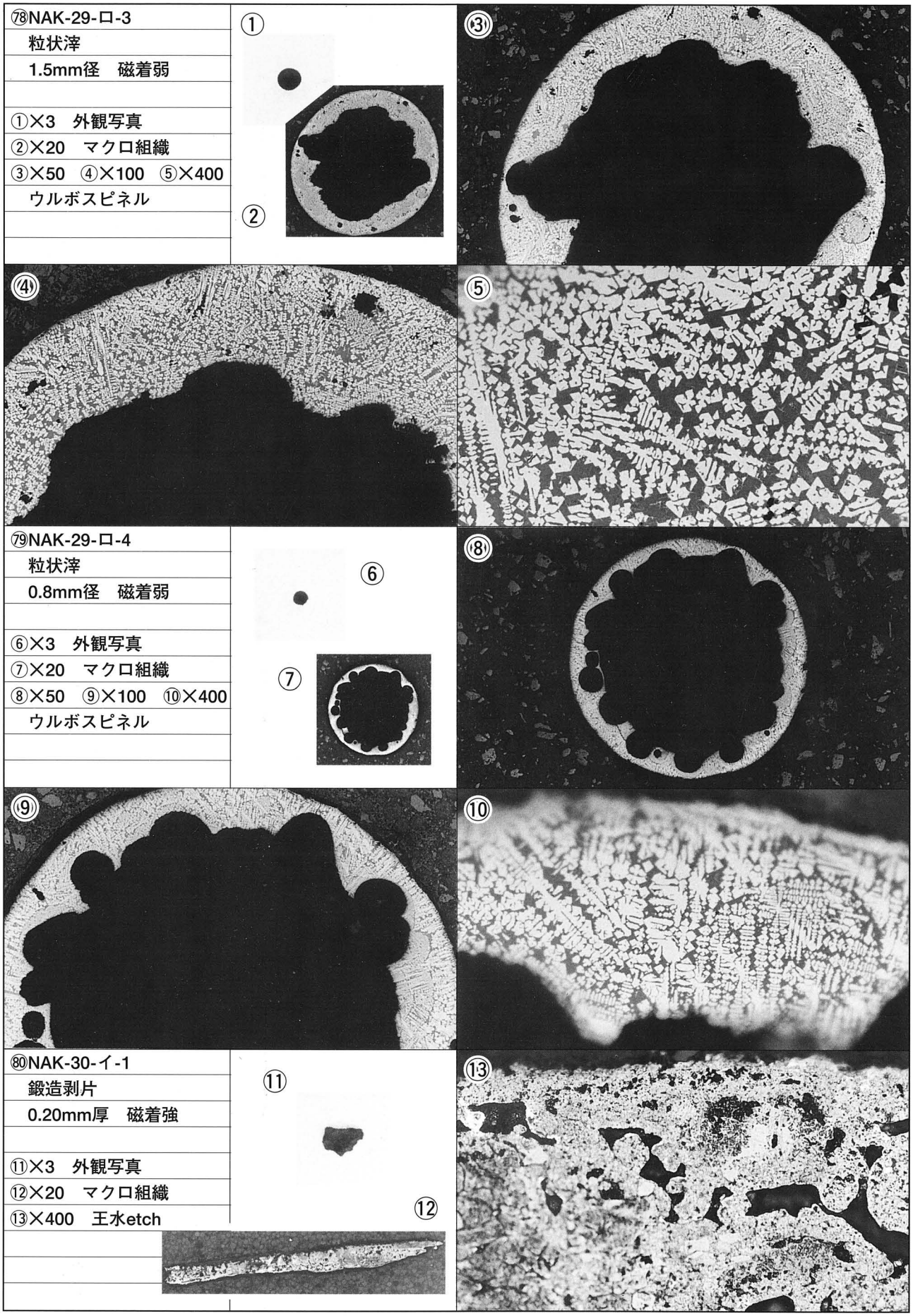
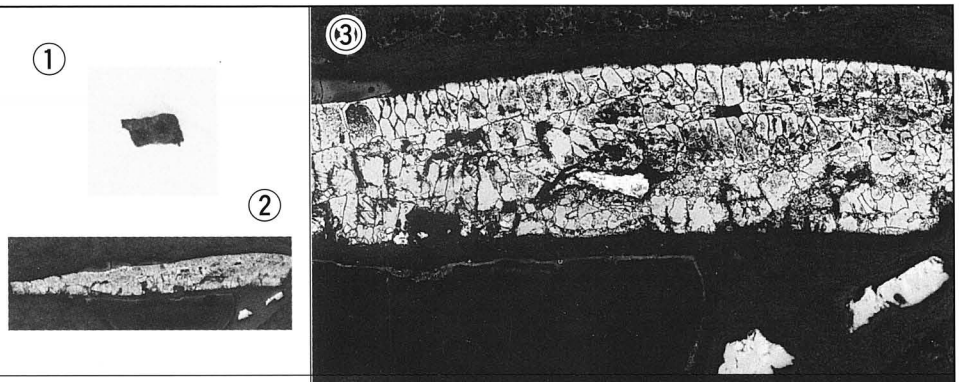


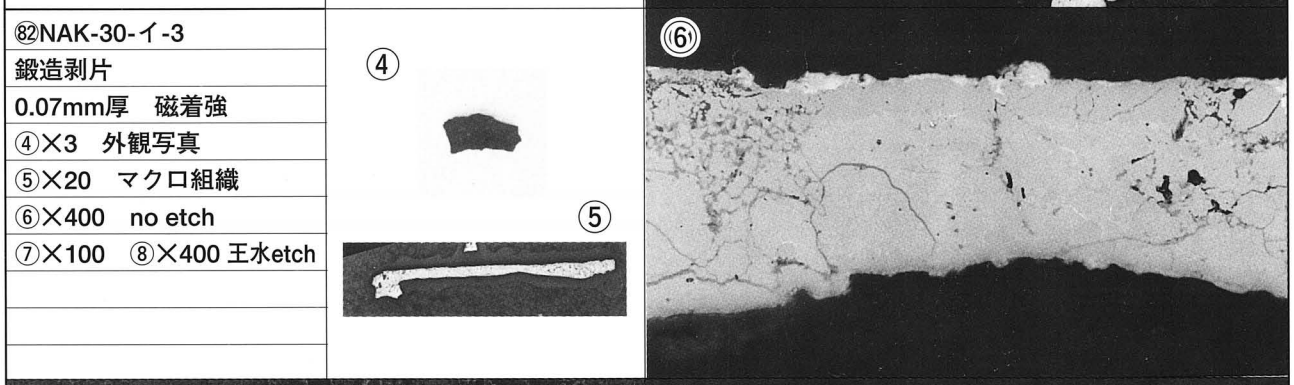
Photo.40　粒状滓と鍛造剥片の顕微鏡組織

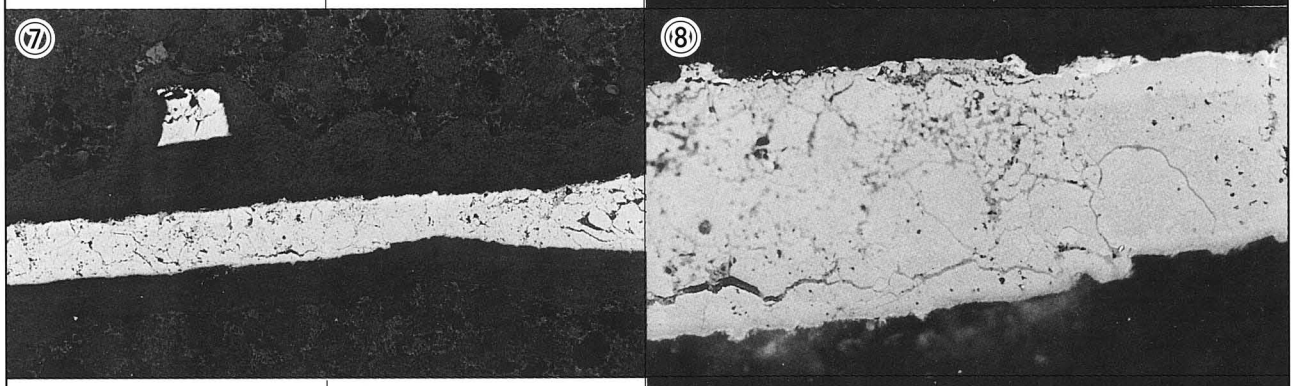
㉑NAK-30-イ-2
鍛造剥片
0.14mm厚　磁着強

①×3　外観写真
②×20　マクロ組織
③×100　王水etch



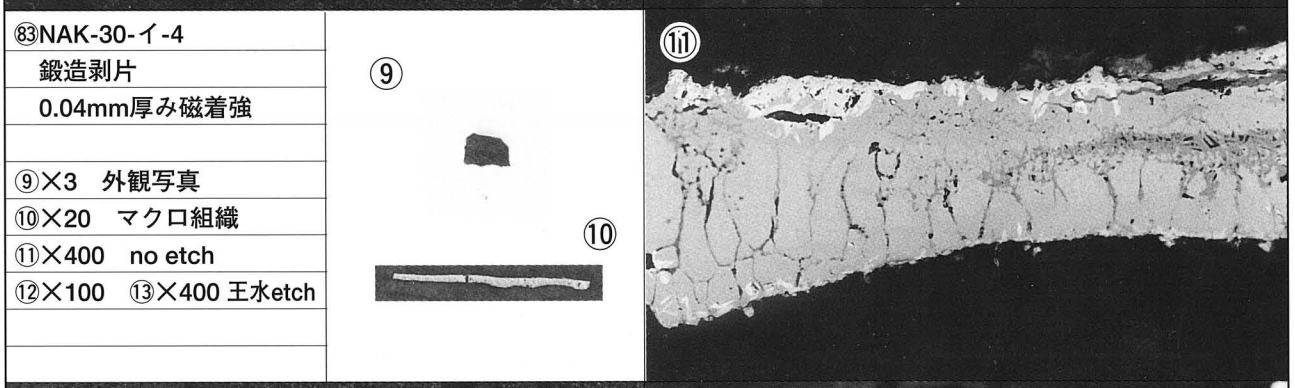
㉒NAK-30-イ-3
鍛造剥片
0.07mm厚　磁着強
④×3　外観写真
⑤×20　マクロ組織
⑥×400　no etch
⑦×100　⑧×400 王水etch





㉓NAK-30-イ-4
鍛造剥片
0.04mm厚み磁着強

⑨×3　外観写真
⑩×20　マクロ組織
⑪×400　no etch
⑫×100　⑬×400 王水etch



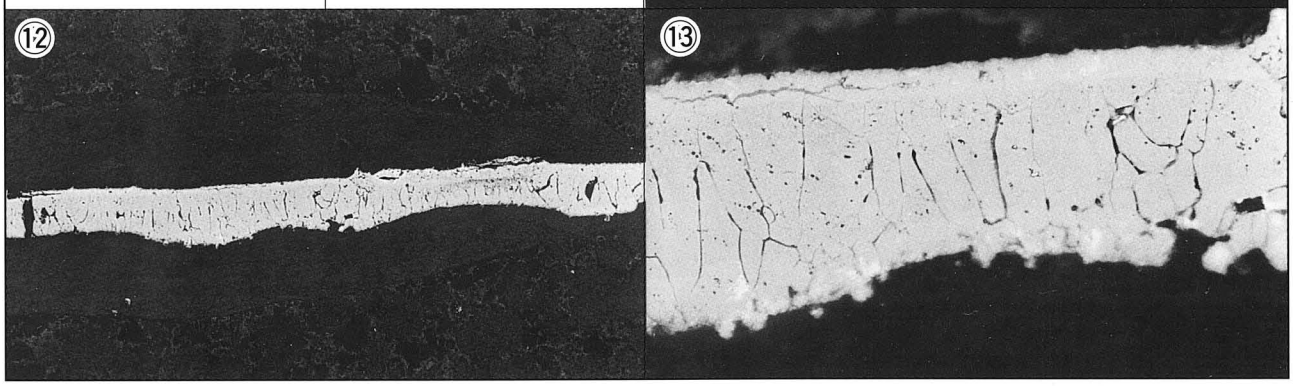


Photo.41　鍛造剥片の顕微鏡組織

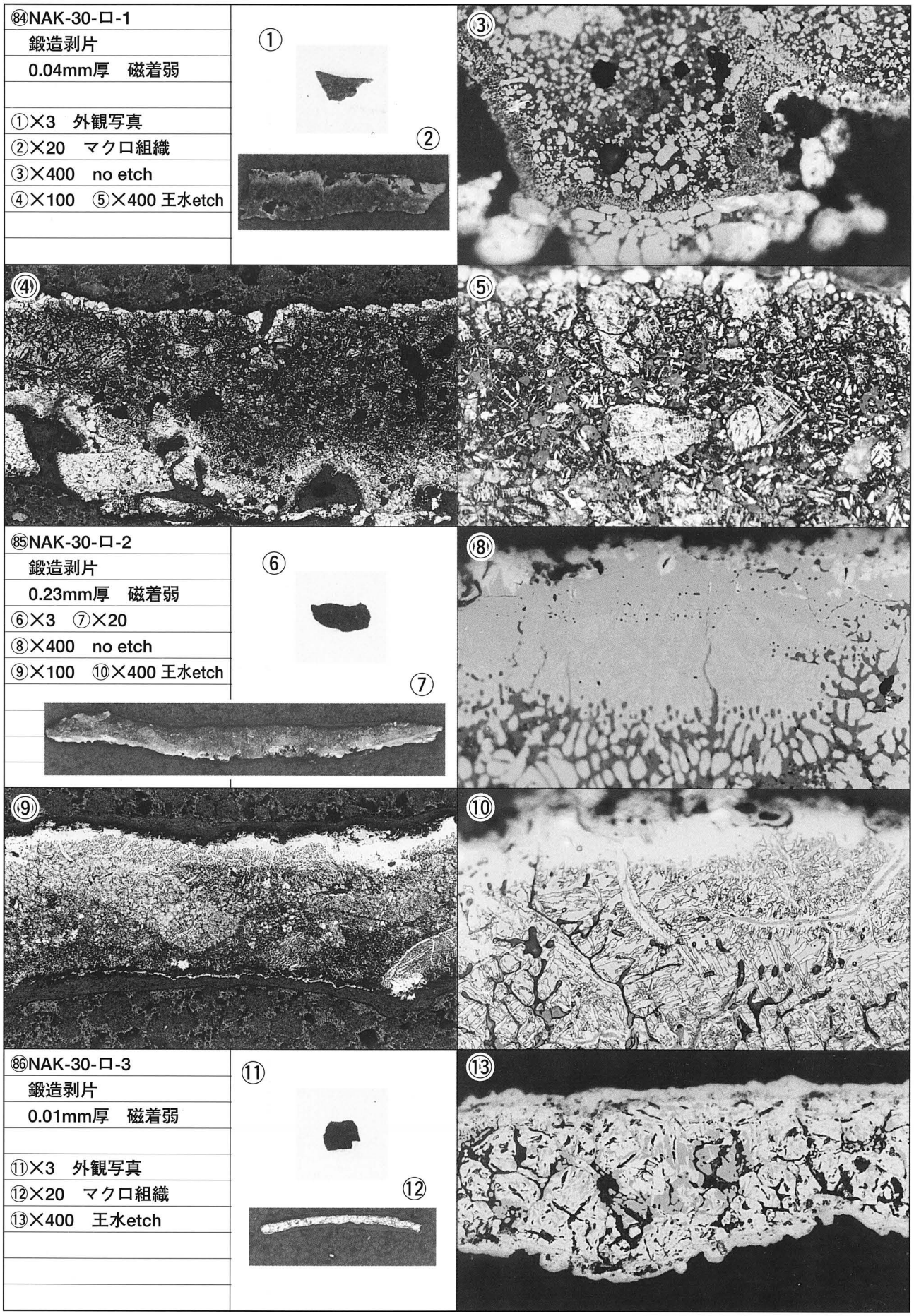
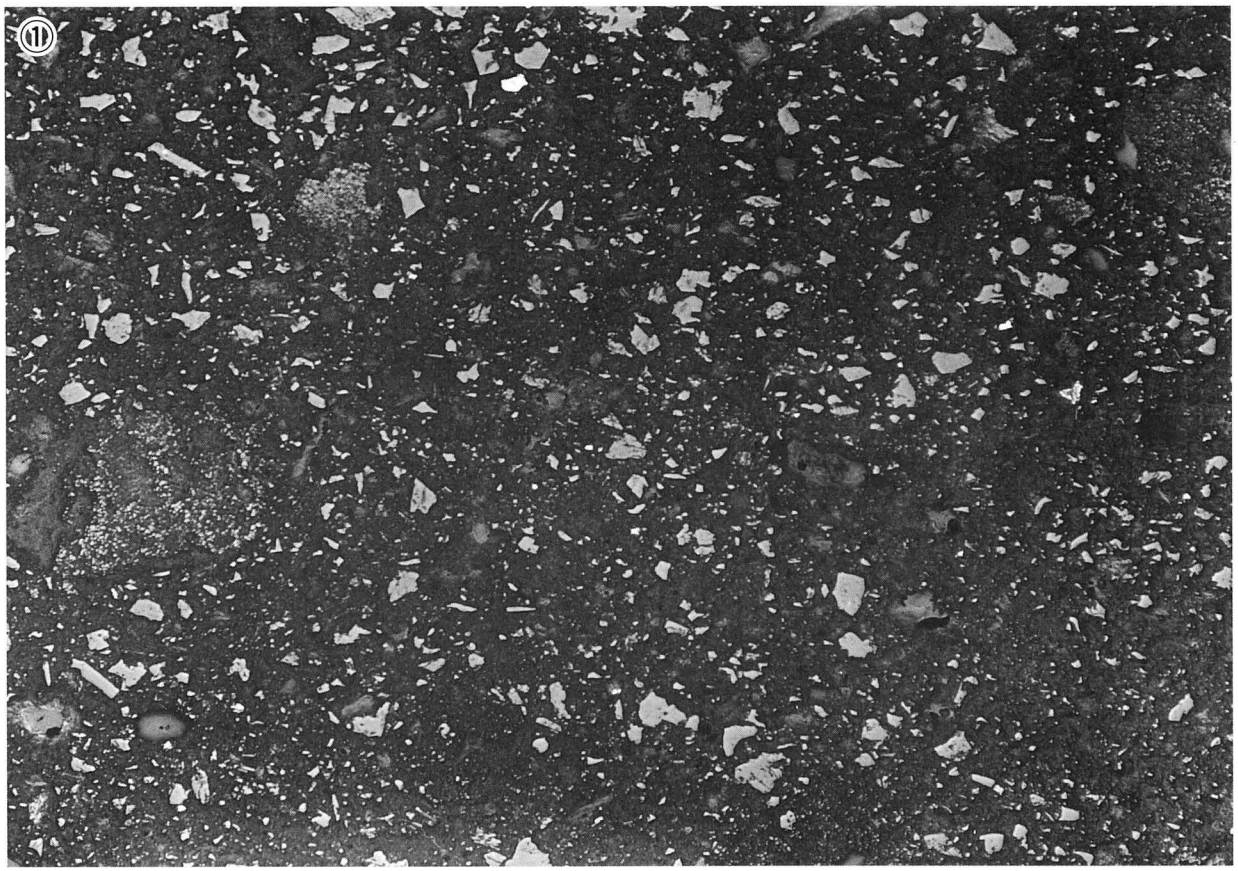
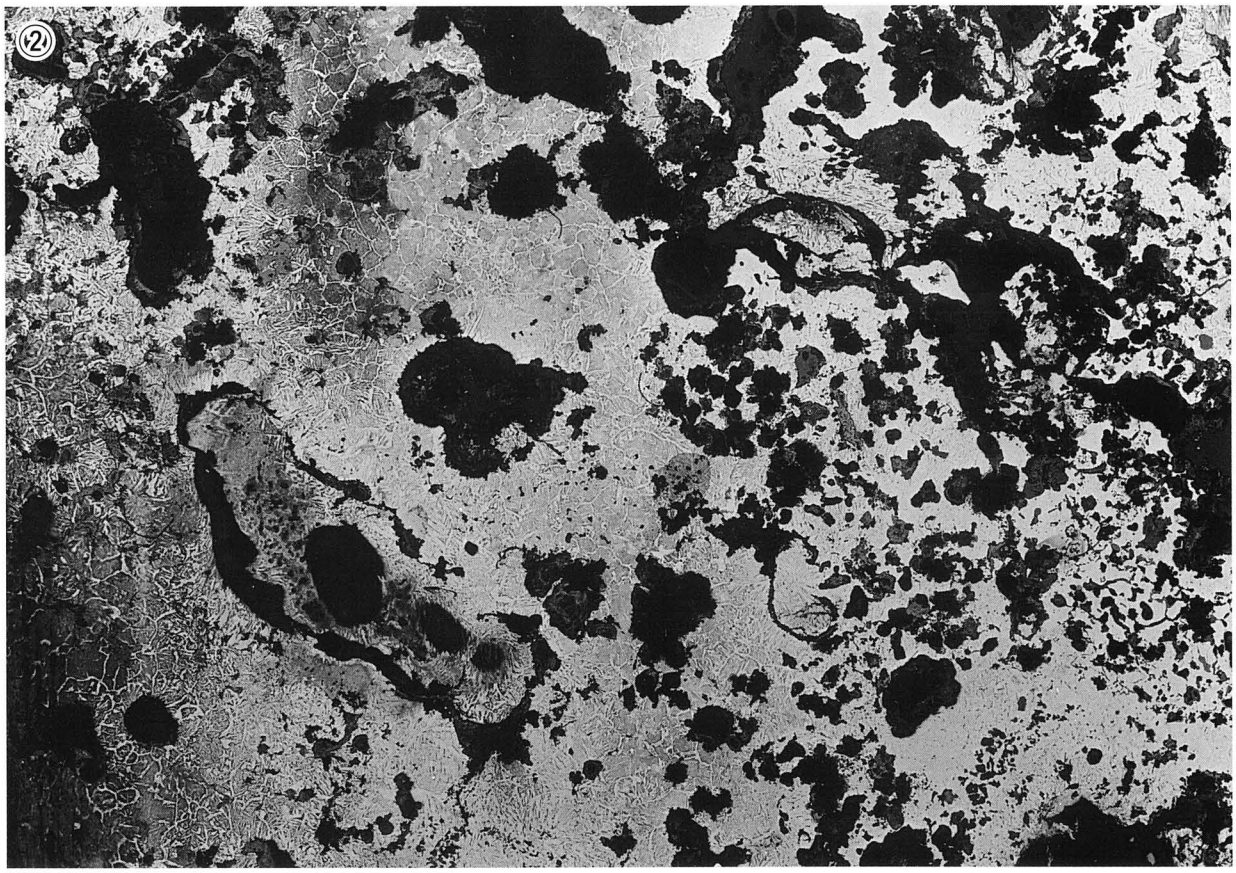


Photo.42　鍛造剥片の顕微鏡組織

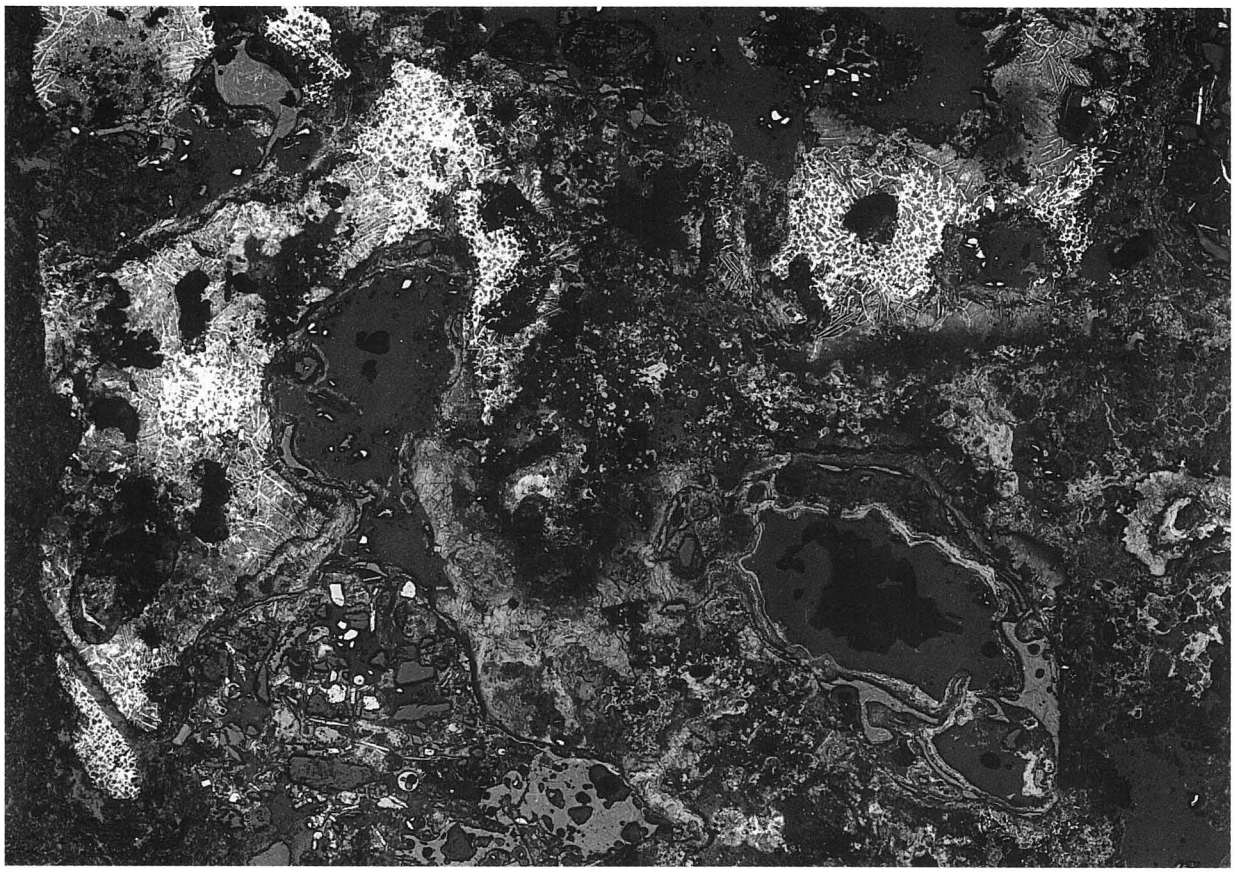


NAK-6　×10

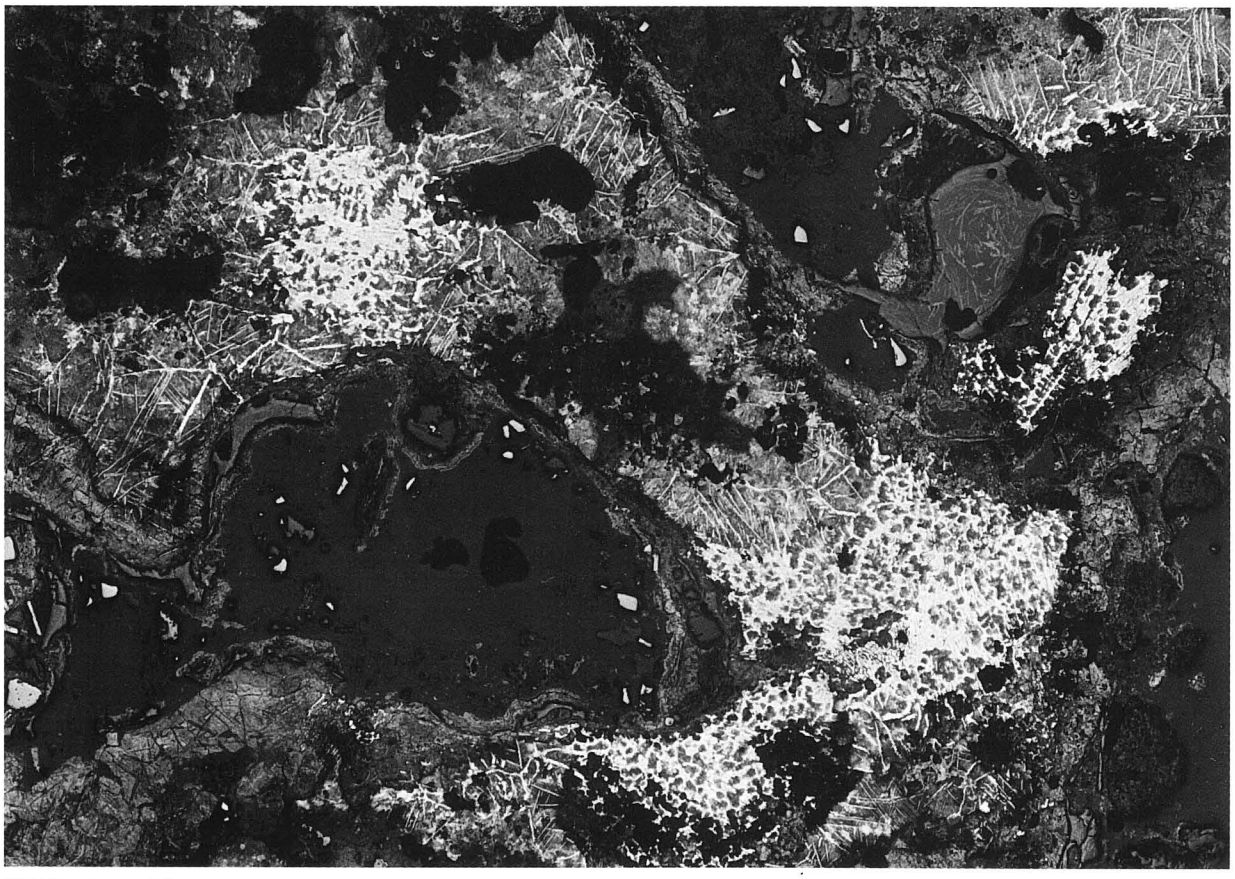


NAK－16　×10

Photo.43　上段：羽口(NAK-6)のマクロ組織（×10）
下段：含鉄椀形滓(NAK-16)のマクロ組織（×10）

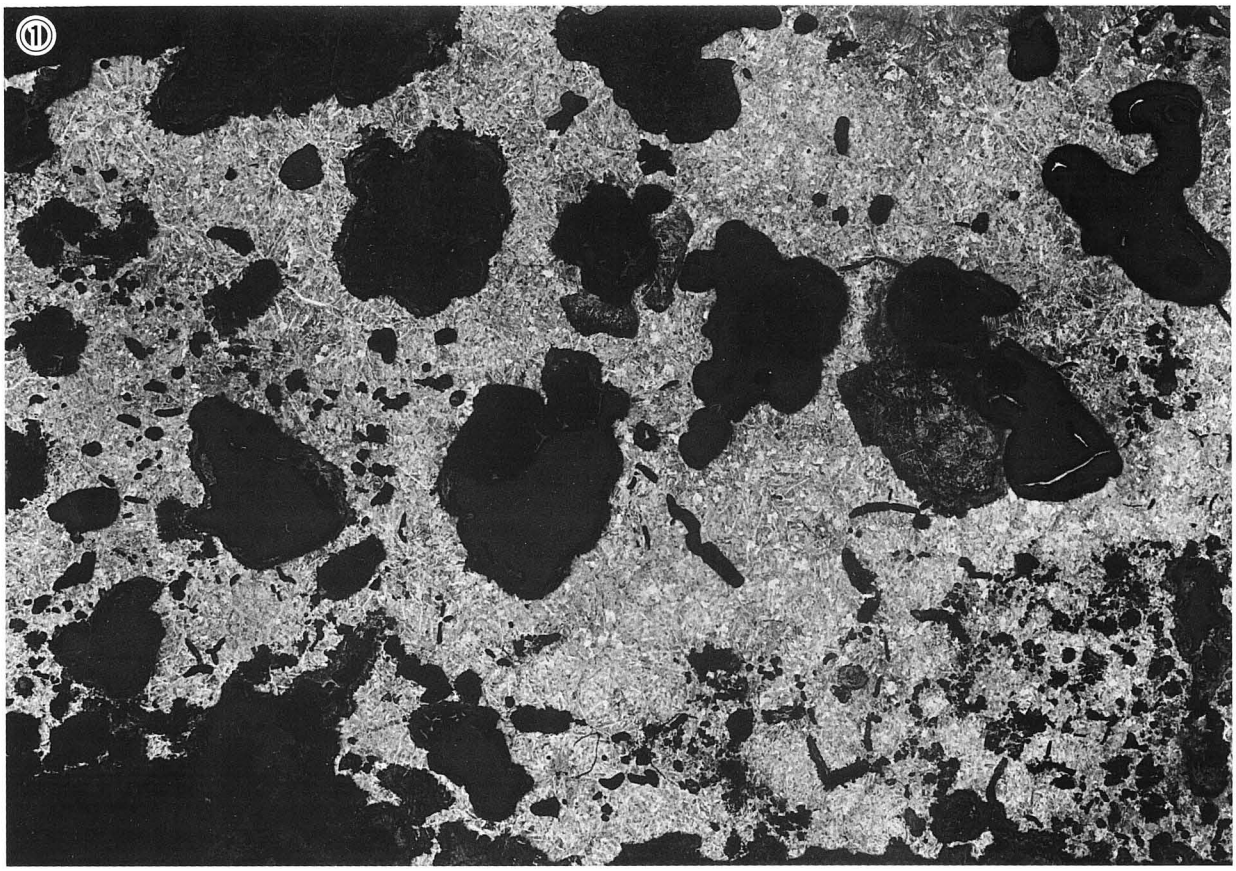


NAK－8　×10

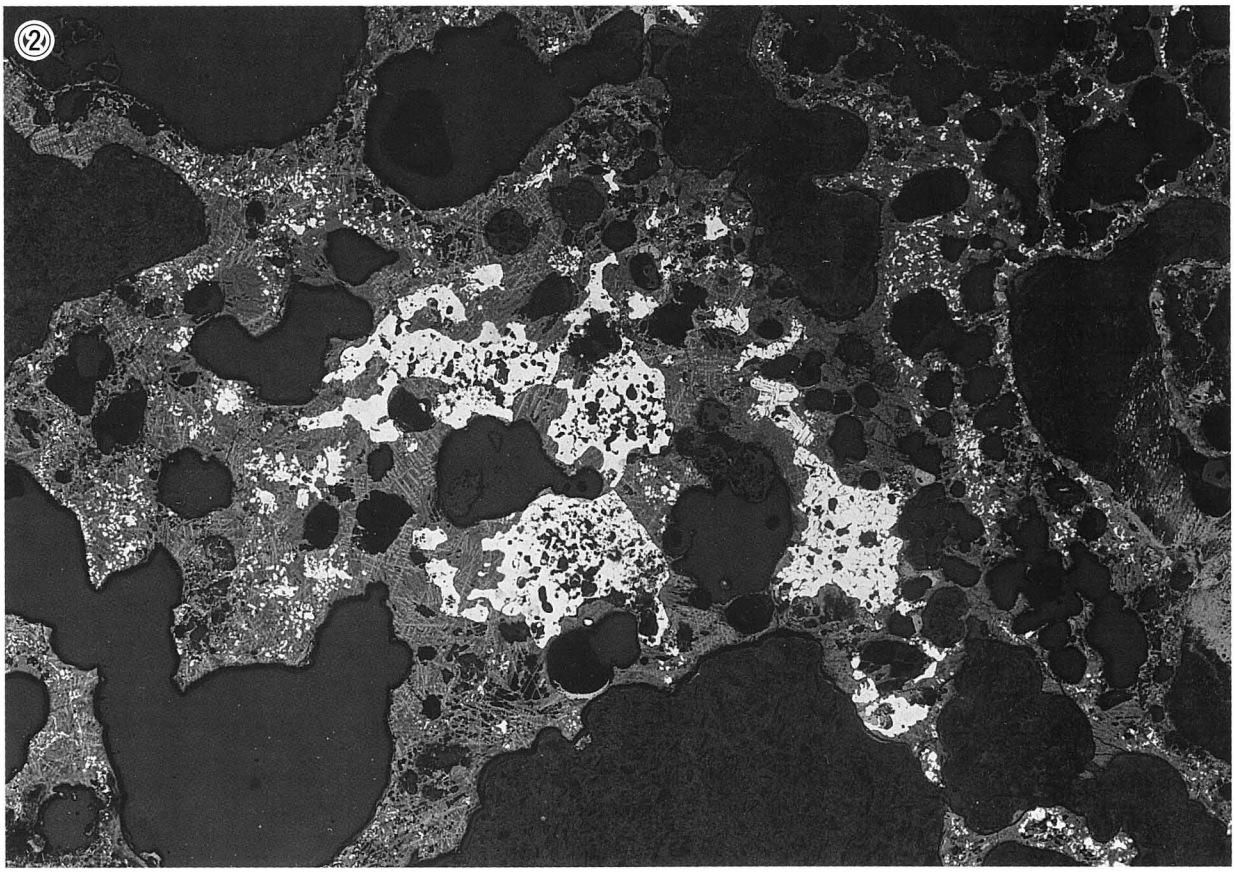


NAK－8　×20

Photo.44　再結合滓(NAK-8)のマクロ組織　上段：(×10)　下段：(×20)

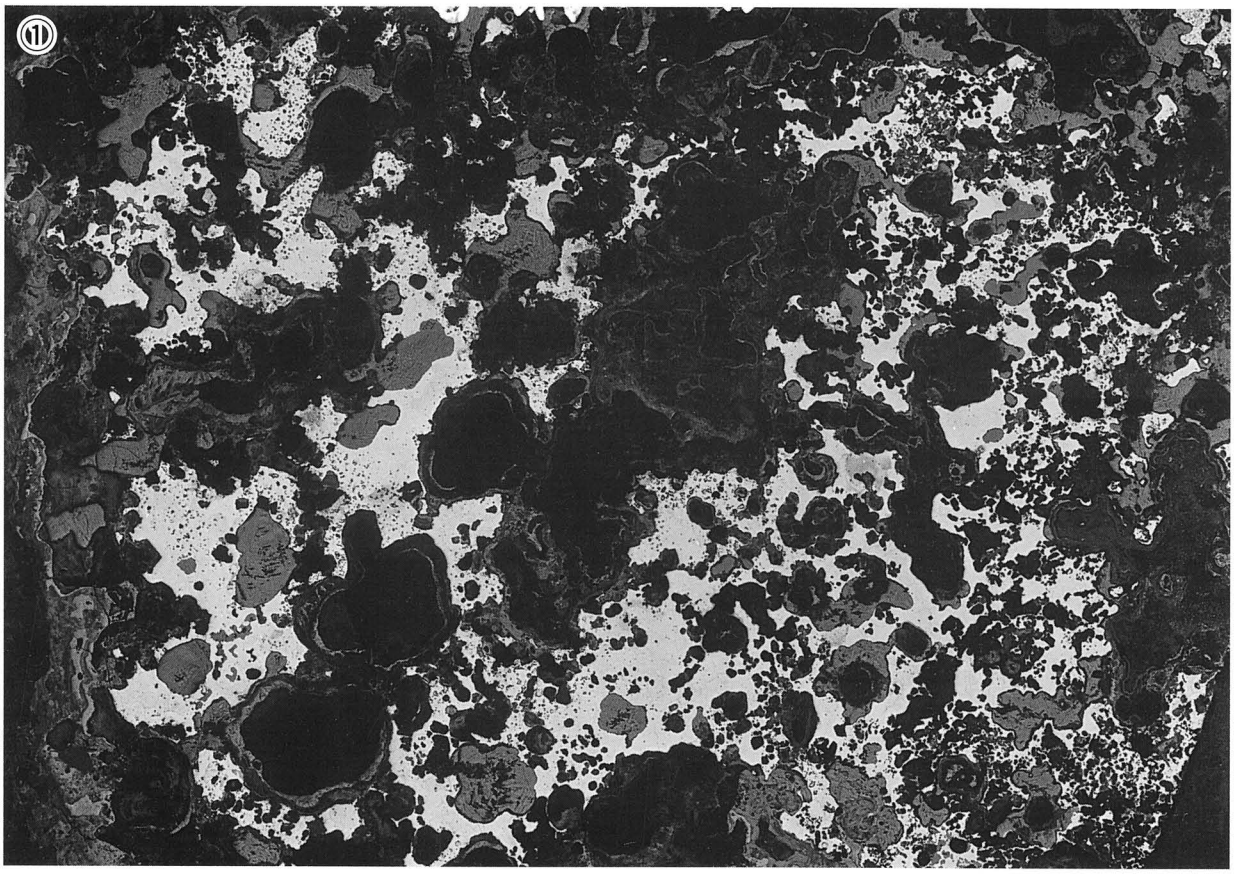


NAK－17　×10

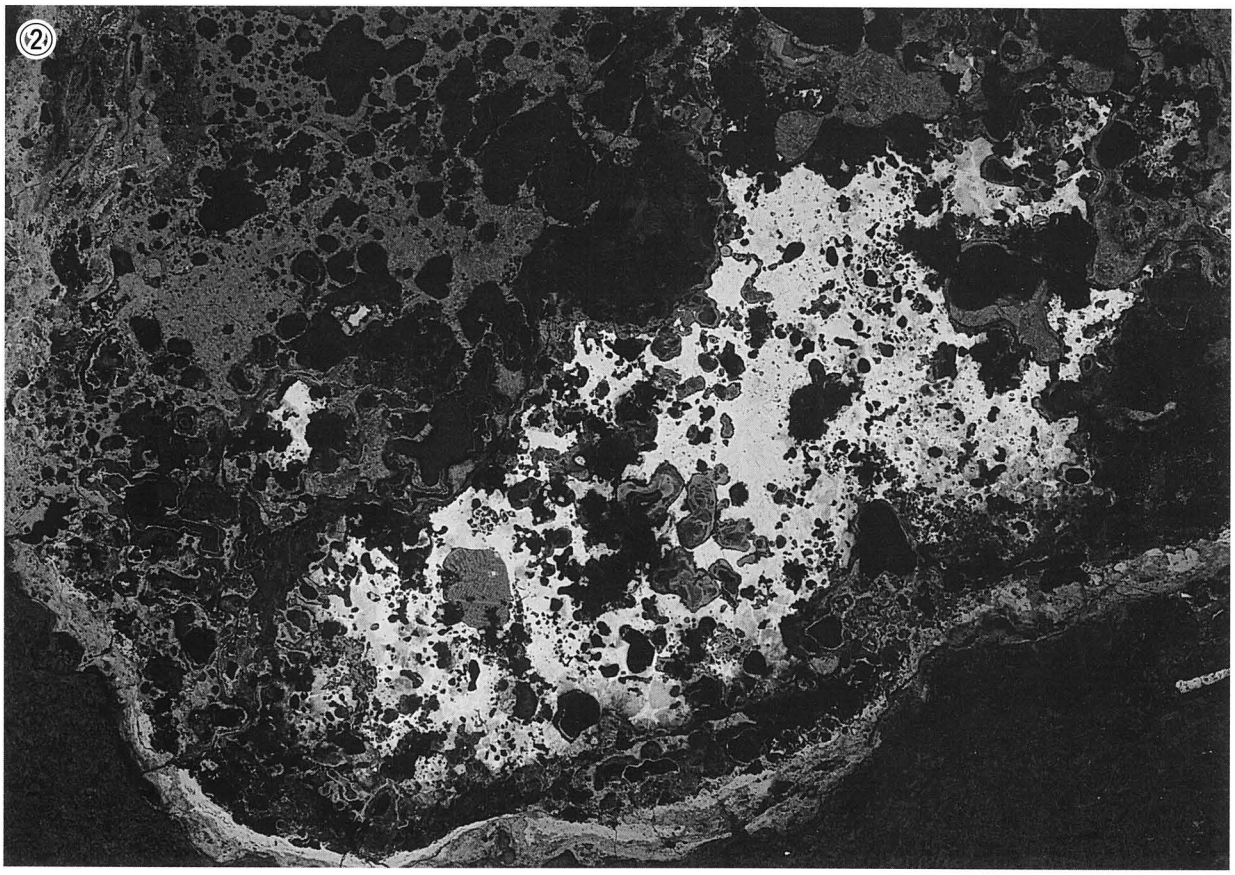


NAK－18　×10

Photo.45　上段：含鉄椀形滓(NAK-17)のマクロ組織（×10）
下段：含鉄椀形滓(NAK-18)のマクロ組織（×10）

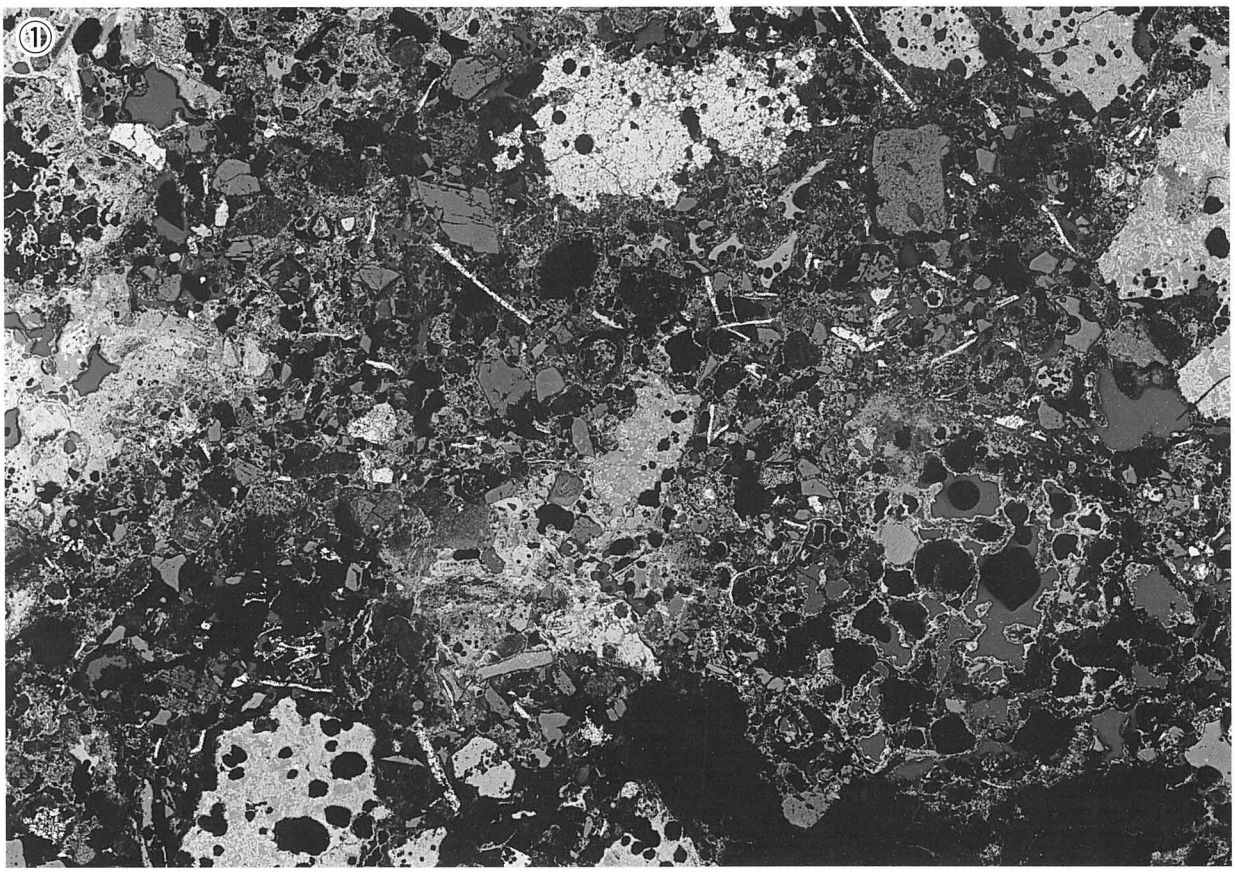


NAK－19　×10

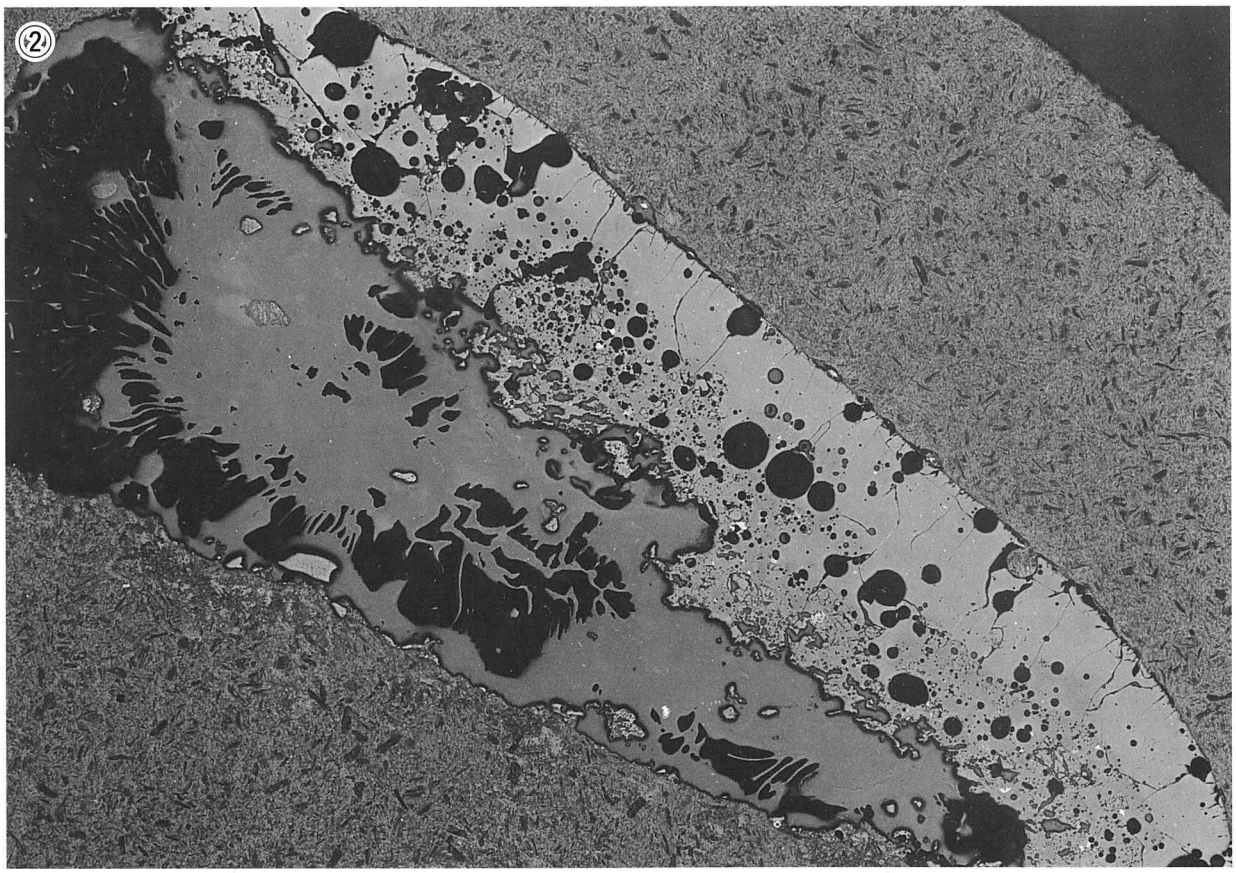


NAK－20　×10

Photo.46　上段：含鉄鉄滓(NAK-19)のマクロ組織（×10）
下段：含鉄鉄滓(NAK-20)のマクロ組織（×10）

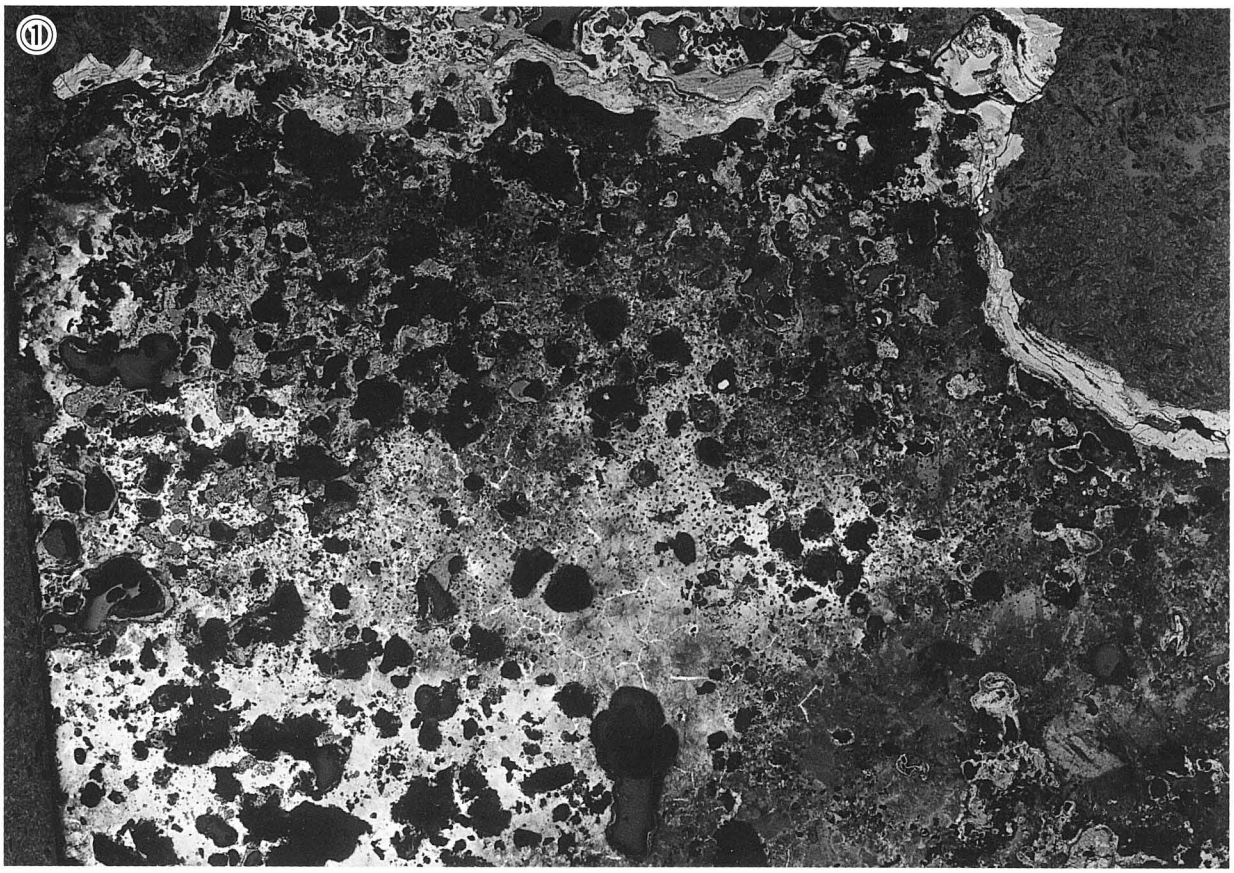


NAK－21　×10

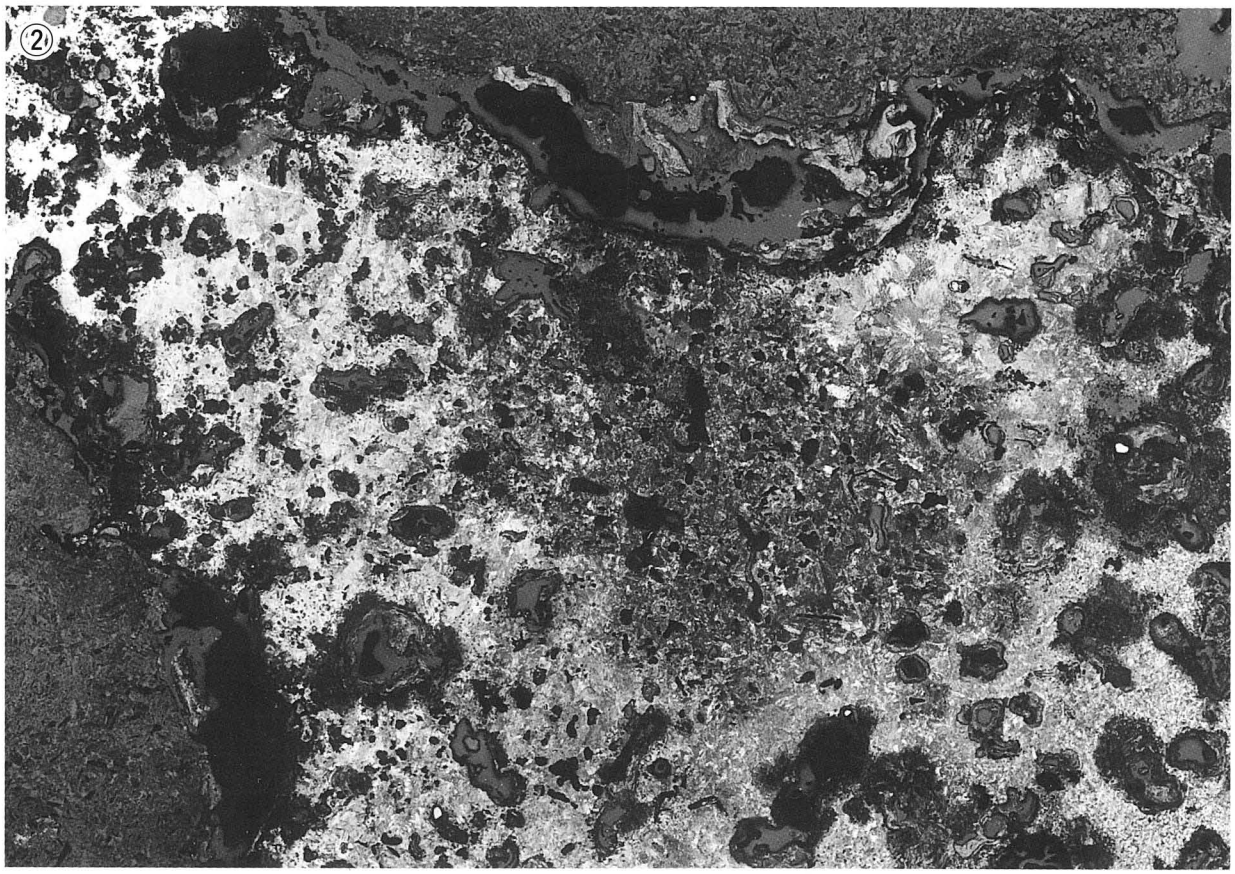


NAK－22　×10

Photo.47　上段：再結合滓(NAK-21)のマクロ組織（×10）
下段：羽口(NAK-22)のマクロ組織（×10）

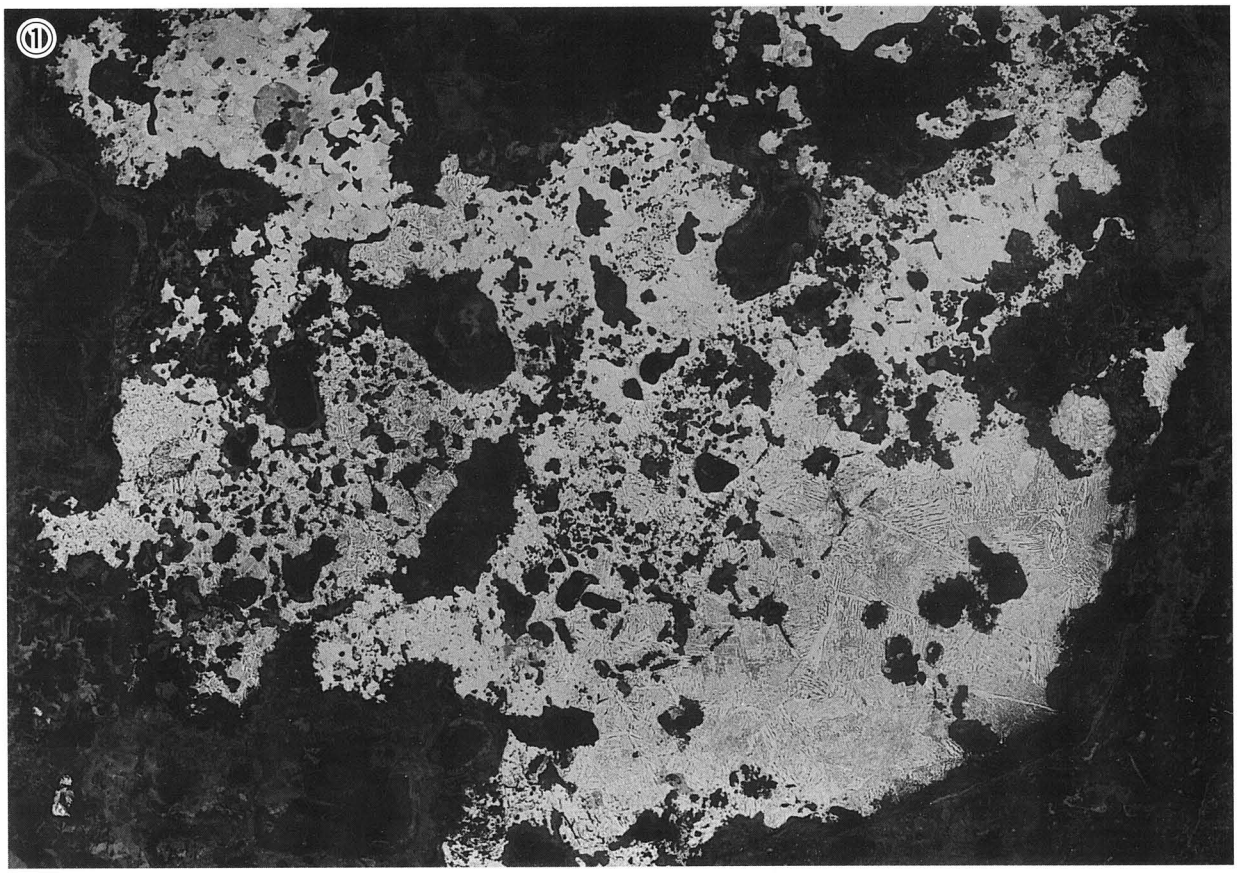


NAK－24　×10

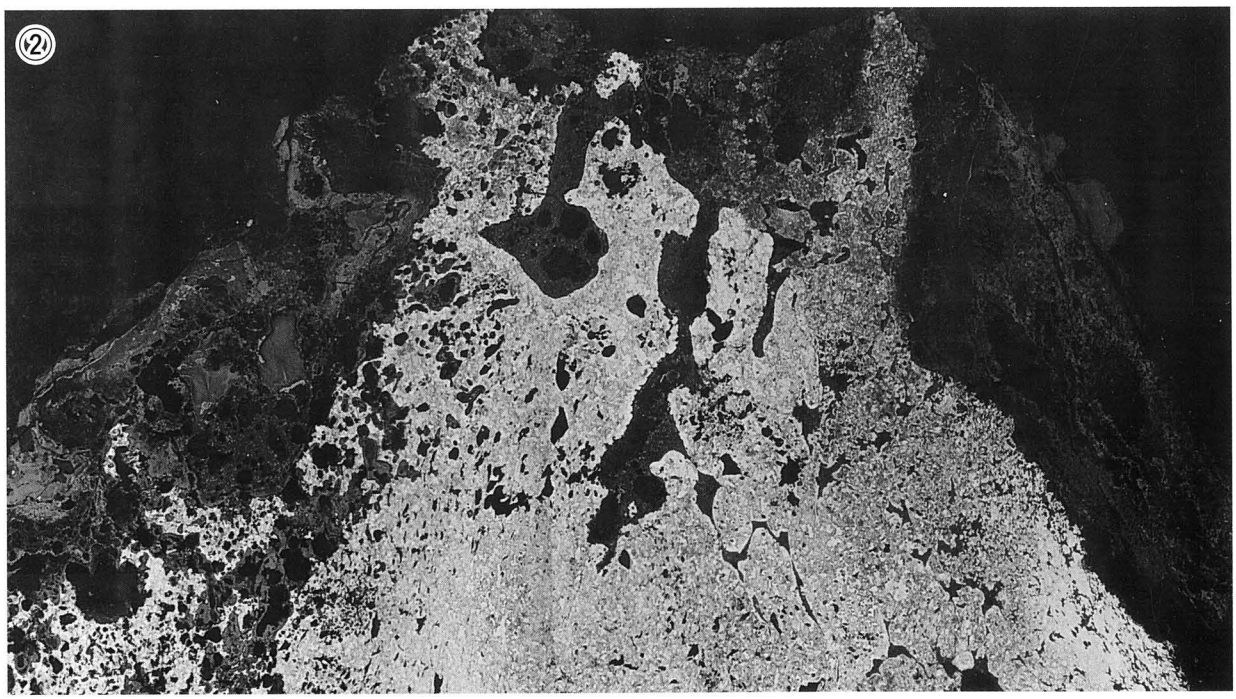


NAK－25　×20

Photo.48　上段：含鉄椀形滓(NAK-24)のマクロ組織（×10）
下段：含鉄椀形滓(NAK-25)のマクロ組織（×20）



NAK－26　×10



NAK－27　×10

Photo.49　上段：粗鉄鋌(切鉄？)(NAK-26)のマクロ組織（×10）
下段：粗鉄鋌(切鉄？)(NAK-27)のマクロ組織（×20）

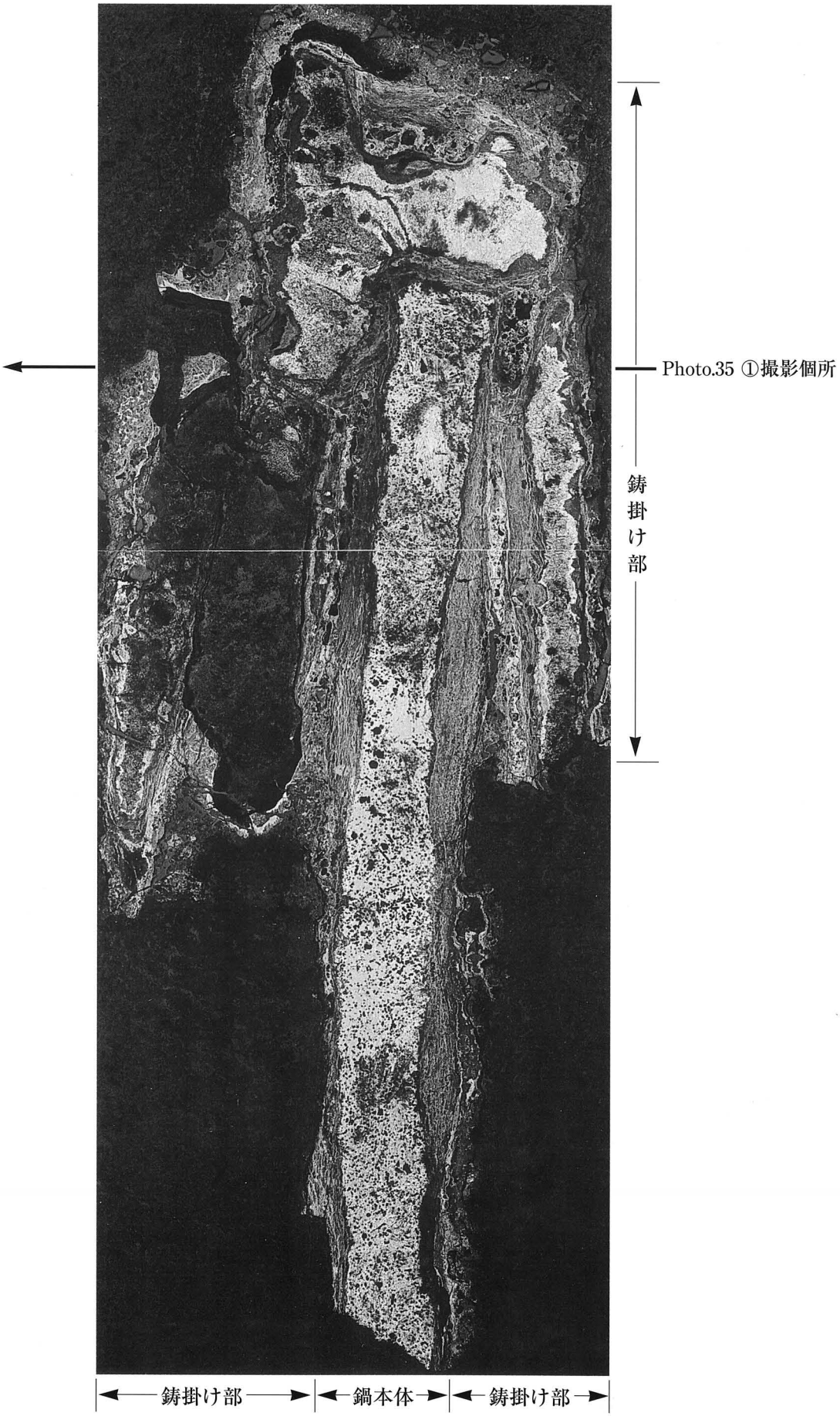
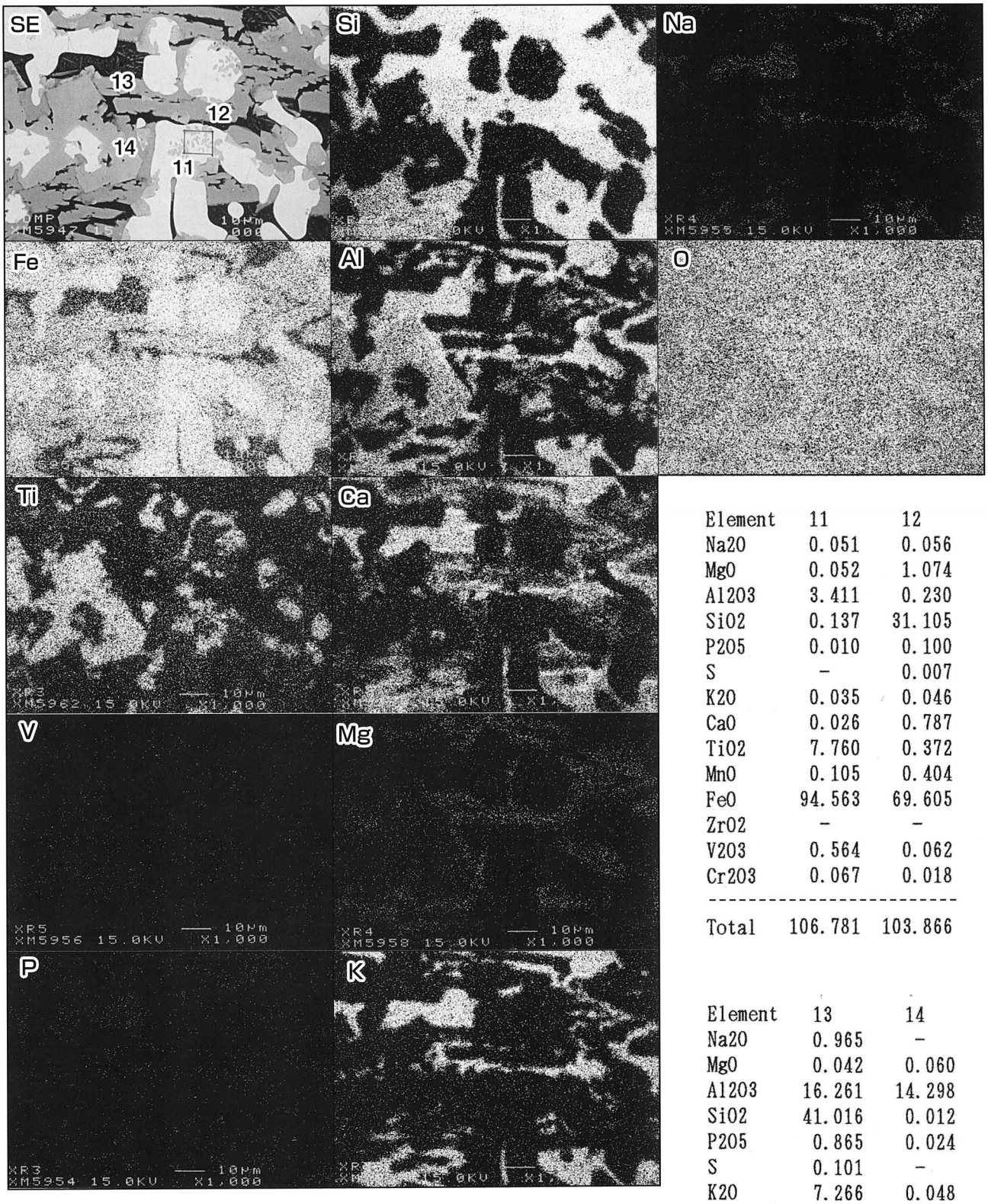


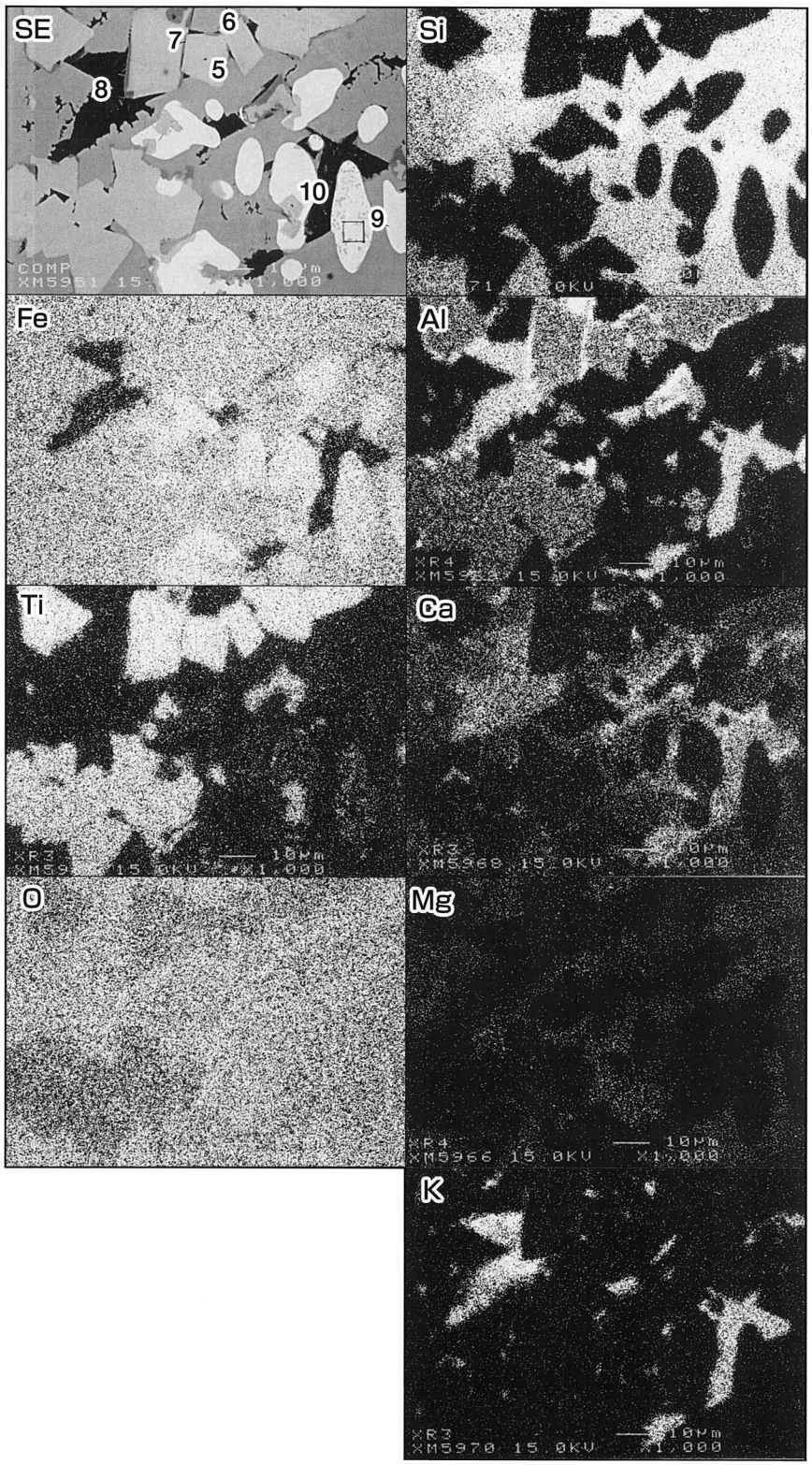
Photo.50　鉄製品（鉄鍋）（NAK-28）のマクロ組織（×10）



Element	11	12
Na2O	0.051	0.056
MgO	0.052	1.074
Al2O3	3.411	0.230
SiO2	0.137	31.105
P2O5	0.010	0.100
S	-	0.007
K2O	0.035	0.046
CaO	0.026	0.787
TiO2	7.760	0.372
MnO	0.105	0.404
FeO	94.563	69.605
ZrO2	-	-
V2O3	0.564	0.062
Cr2O3	0.067	0.018
Total	106.781	103.866

Element	13	14
Na2O	0.965	-
MgO	0.042	0.060
Al2O3	16.261	14.298
SiO2	41.016	0.012
P2O5	0.865	0.024
S	0.101	-
K2O	7.266	0.048
CaO	11.455	0.064
TiO2	0.352	18.361
MnO	0.128	0.134
FeO	29.663	70.922
ZrO2	-	0.088
V2O3	0.013	1.133
Cr2O3	0.025	0.168
Total	108.152	105.312

Photo.51　鍛冶滓(NAK-1)鉱物相の特性X線像と定量分析値

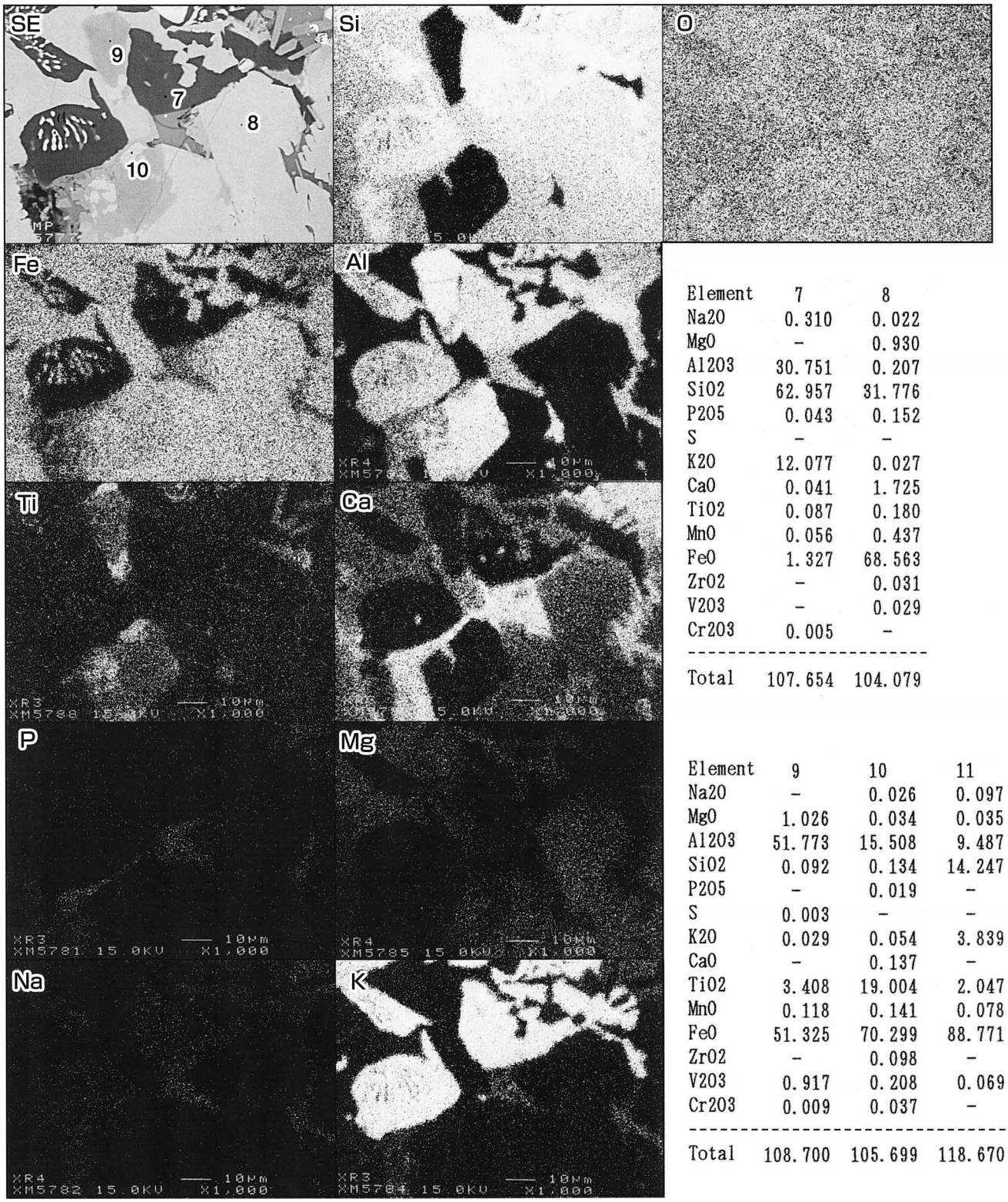


Element	5	6
Na2O	-	-
MgO	0.235	1.633
Al2O3	10.703	0.477
SiO2	0.054	31.506
P2O5	0.019	0.155
S	-	0.005
K2O	-	0.008
CaO	-	0.889
TiO2	21.515	0.587
MnO	0.148	0.554
FeO	69.002	68.264
ZrO2	-	-
V2O3	0.761	-
Cr2O3	0.037	-
Total	102.474	104.078

Element	7	8
Na2O	-	0.937
MgO	0.376	0.044
Al2O3	47.094	24.690
SiO2	0.352	45.322
P2O5	0.007	1.120
S	-	0.054
K2O	-	11.211
CaO	0.015	3.717
TiO2	5.576	0.754
MnO	0.294	0.047
FeO	54.675	15.759
ZrO2	-	0.224
V2O3	0.124	0.010
Cr2O3	0.056	-
Total	108.569	103.889

Element	9	10
Na2O	-	-
MgO	0.023	0.039
Al2O3	1.600	13.367
SiO2	0.071	0.257
P2O5	-	0.041
S	0.018	0.007
K2O	-	-
CaO	-	0.407
TiO2	3.175	17.917
MnO	0.144	0.185
FeO	96.877	70.473
ZrO2	-	0.059
V2O3	0.109	0.389
Cr2O3	-	-
Total	102.017	103.141

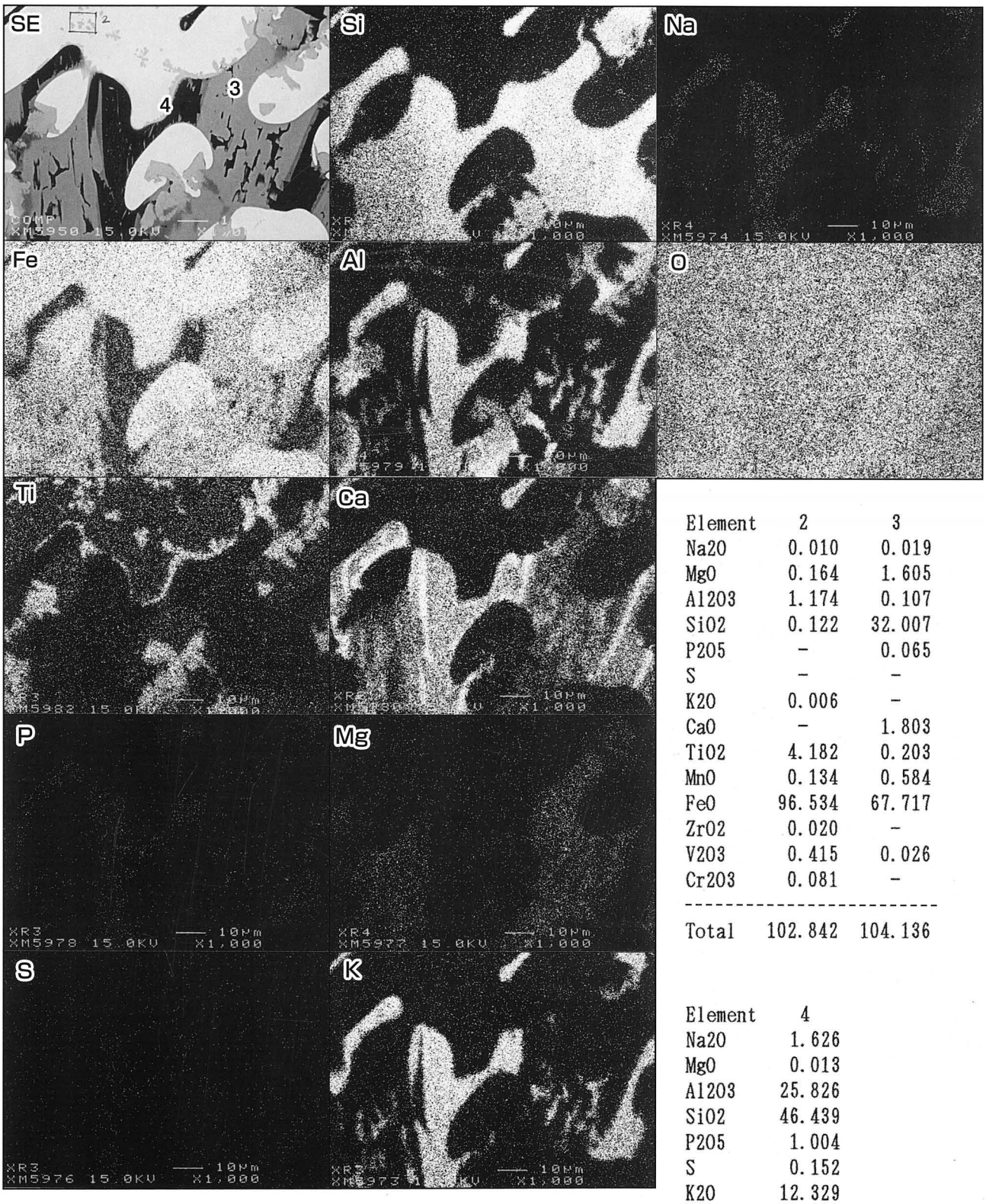
Photo.52　椀形鍛冶滓(NAK-5)鉱物相の特性X線像と定量分析値



Element	7	8
Na2O	0.310	0.022
MgO	-	0.930
Al2O3	30.751	0.207
SiO2	62.957	31.776
P2O5	0.043	0.152
S	-	-
K2O	12.077	0.027
CaO	0.041	1.725
TiO2	0.087	0.180
MnO	0.056	0.437
FeO	1.327	68.563
ZrO2	-	0.031
V2O3	-	0.029
Cr2O3	0.005	-
Total	107.654	104.079

Element	9	10	11
Na2O	-	0.026	0.097
MgO	1.026	0.034	0.035
Al2O3	51.773	15.508	9.487
SiO2	0.092	0.134	14.247
P2O5	-	0.019	-
S	0.003	-	-
K2O	0.029	0.054	3.839
CaO	-	0.137	-
TiO2	3.408	19.004	2.047
MnO	0.118	0.141	0.078
FeO	51.325	70.299	88.771
ZrO2	-	0.098	-
V2O3	0.917	0.208	0.069
Cr2O3	0.009	0.037	-
Total	108.700	105.699	118.670

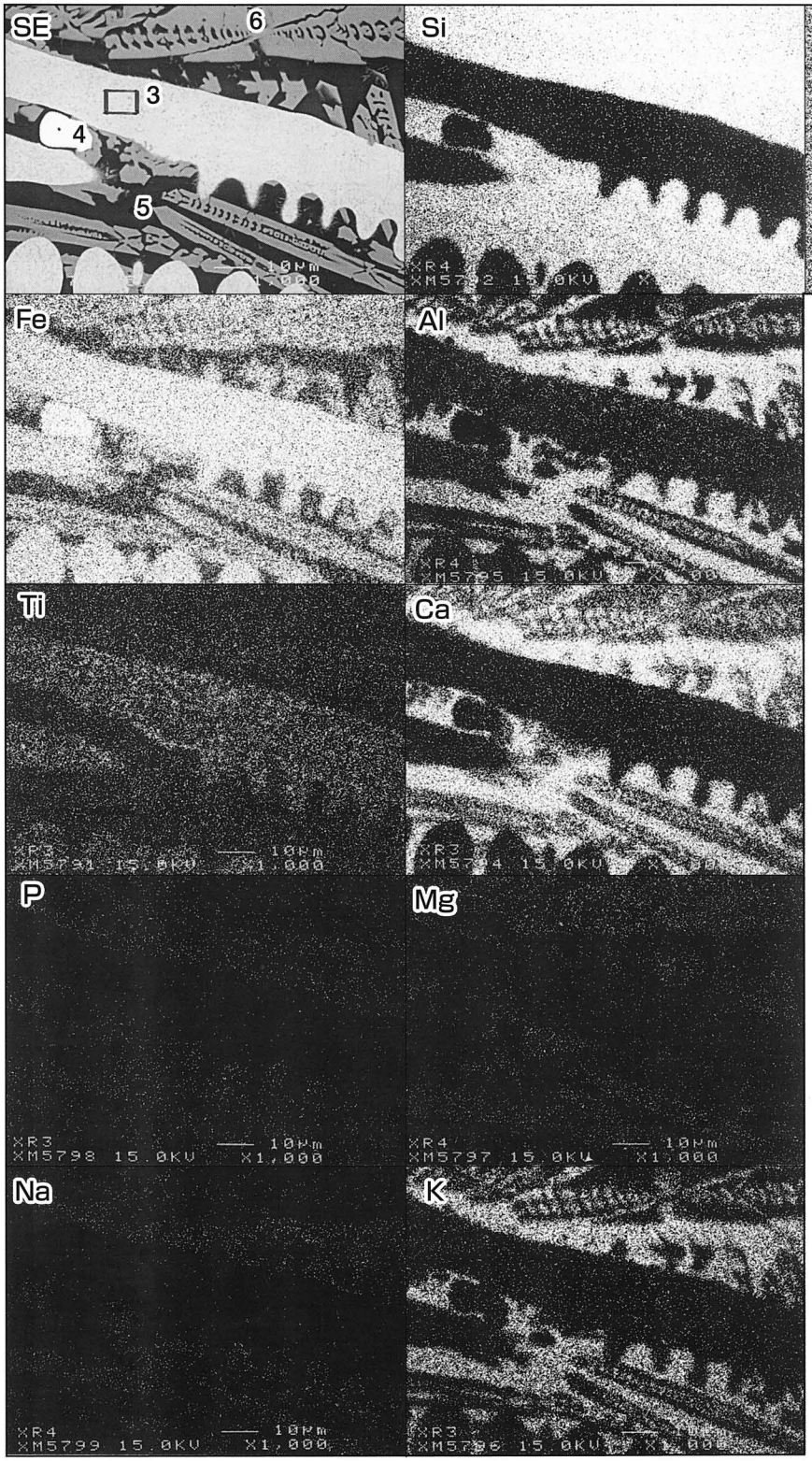
Photo.53　鍛冶滓(NAK-7)鉱物相の特性X線像と定量分析値



Element	2	3
Na2O	0.010	0.019
MgO	0.164	1.605
Al2O3	1.174	0.107
SiO2	0.122	32.007
P2O5	-	0.065
S	-	-
K2O	0.006	-
CaO	-	1.803
TiO2	4.182	0.203
MnO	0.134	0.584
FeO	96.534	67.717
ZrO2	0.020	-
V2O3	0.415	0.026
Cr2O3	0.081	-
Total	102.842	104.136

Element	4
Na2O	1.626
MgO	0.013
Al2O3	25.826
SiO2	46.439
P2O5	1.004
S	0.152
K2O	12.329
CaO	6.286
TiO2	0.404
MnO	0.063
FeO	13.965
ZrO2	0.064
V2O3	-
Cr2O3	0.037
Total	108.208

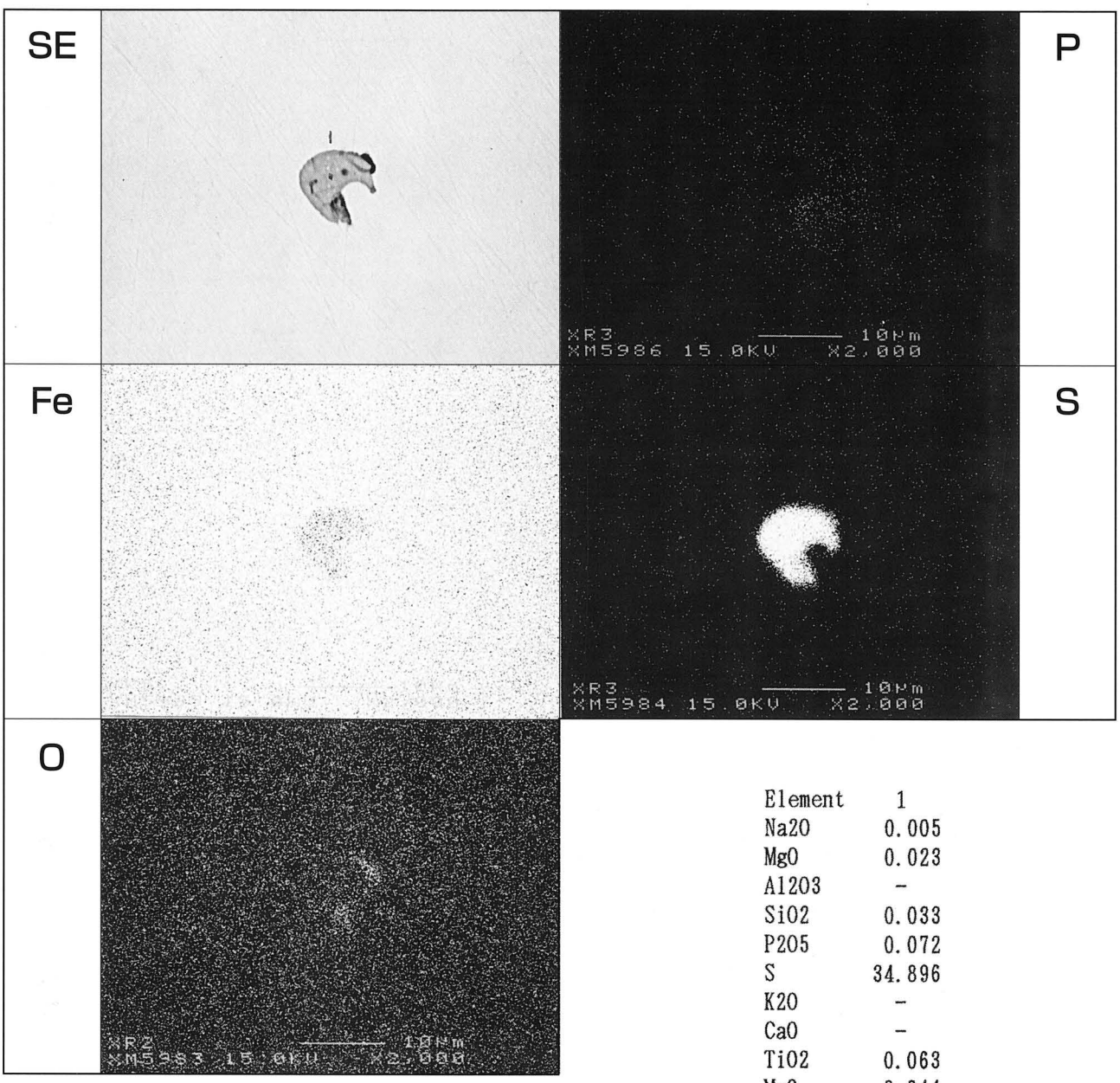
Photo.54　含鉄椀形滓(NAK-12)鉱物相の特性X線像と定量分析値



Element	3	4
Na2O	0.003	0.007
MgO	0.091	0.005
Al2O3	1.176	-
SiO2	0.055	0.037
P2O5	-	-
S	0.010	-
K2O	-	0.001
CaO	-	-
TiO2	2.352	0.188
MnO	0.123	-
FeO	99.149	142.220
ZrO2	0.088	0.098
V2O3	0.171	0.016
Cr2O3	0.024	-
Total	103.242	142.572

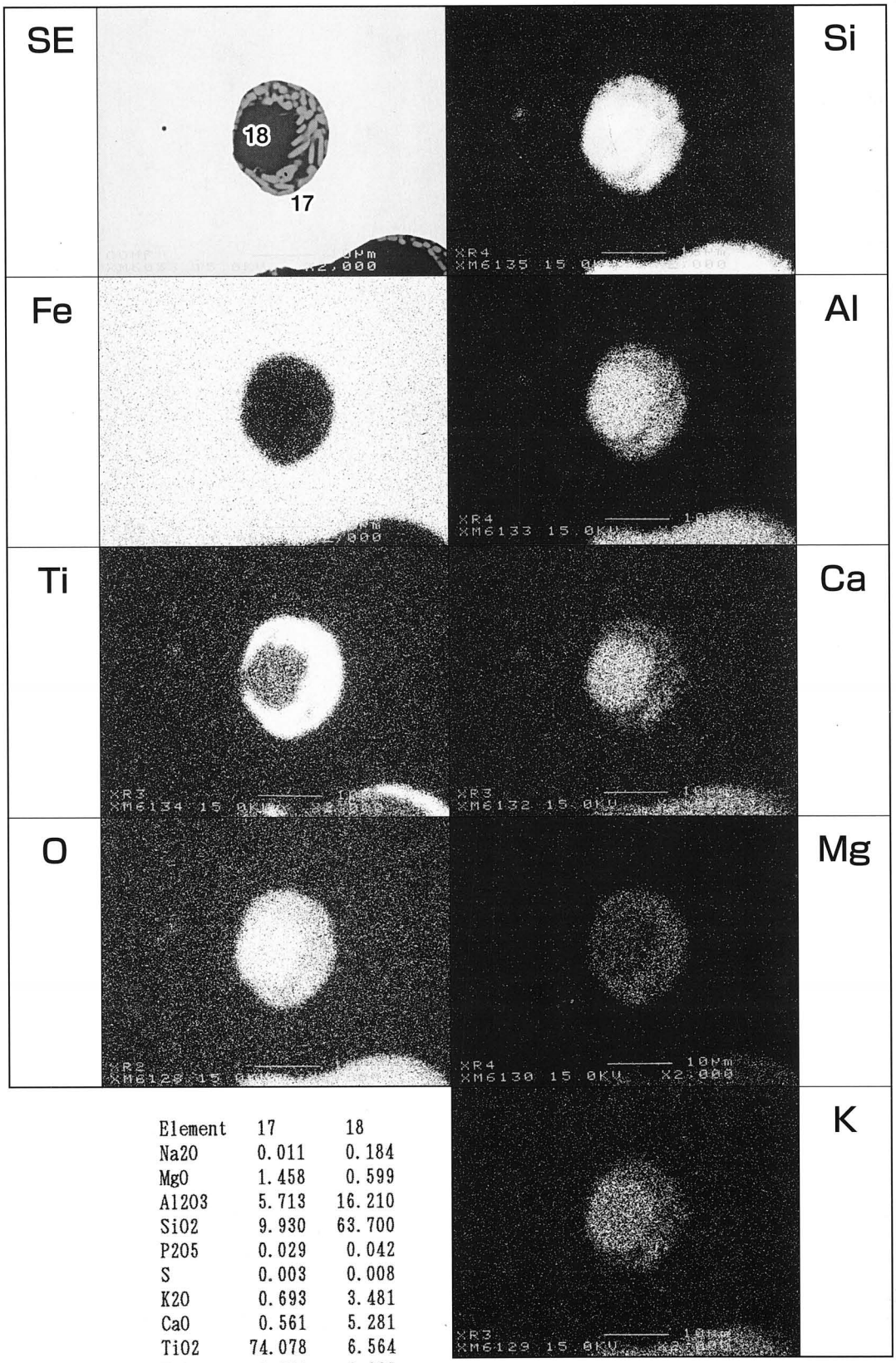
Element	5	6
Na2O	0.953	-
MgO	0.046	0.872
Al2O3	22.714	0.317
SiO2	5.145	4.072
P2O5	1.075	0.184
S	0.089	-
K2O	6.802	0.052
CaO	11.764	1.717
TiO2	0.907	0.285
MnO	0.050	0.240
FeO	22.559	67.934
ZrO2	0.070	0.020
V2O3	0.028	0.017
Cr2O3	0.041	-
Total	72.243	75.710

Photo.55　椀形鍛冶滓(NAK-15)鉱物相の特性X線像と定量分析値



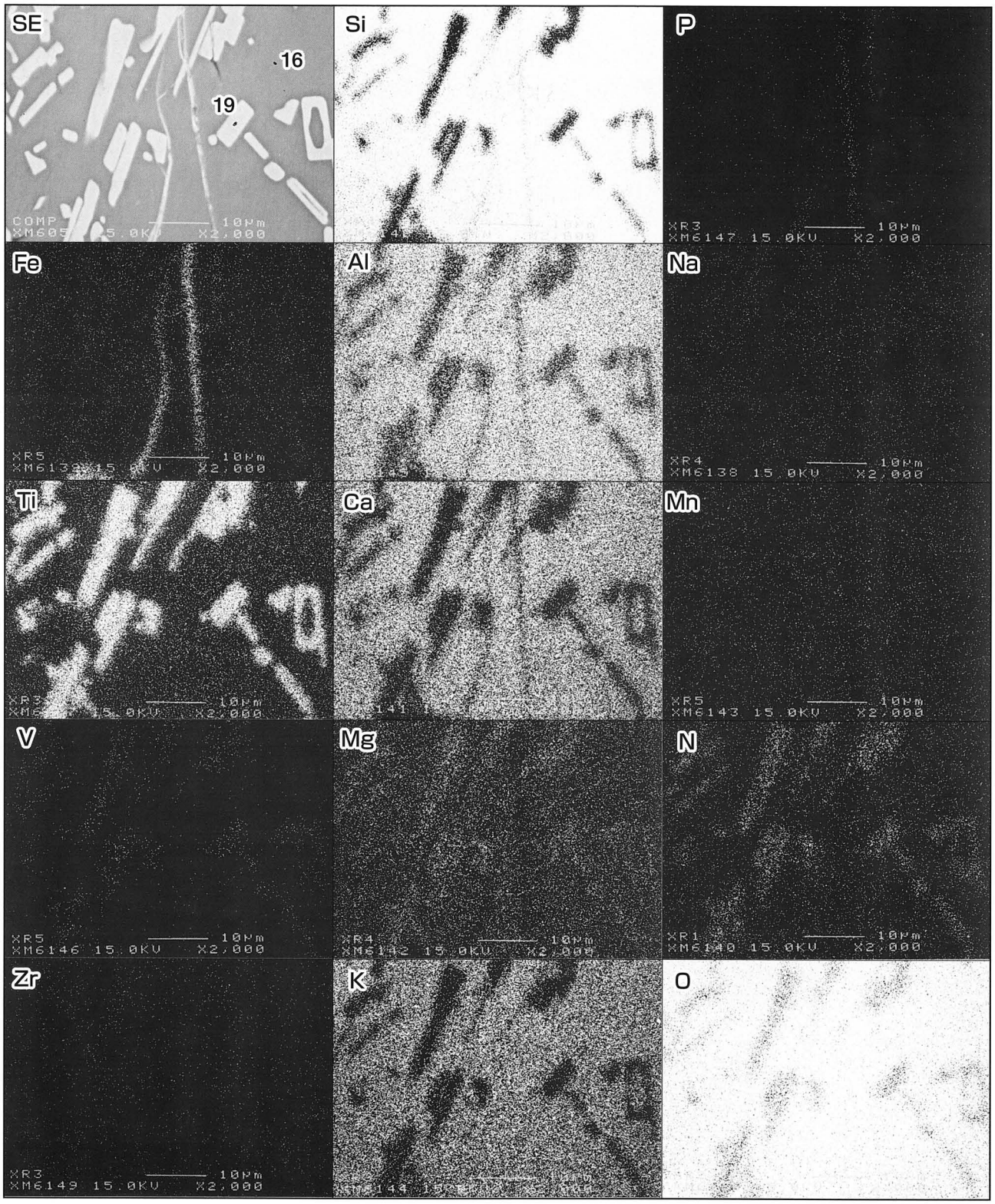
Element	1
Na2O	0.005
MgO	0.023
Al2O3	-
SiO2	0.033
P2O5	0.072
S	34.896
K2O	-
CaO	-
TiO2	0.063
MnO	0.044
FeO	89.984
ZrO2	0.091
V2O3	0.194
Cr2O3	0.081
Total	125.486

Photo.56　含鉄椀形滓(NAK-16)鉄中非金属介在物の特性X線像と定量分析値



Element	17	18
Na2O	0.011	0.184
MgO	1.458	0.599
Al2O3	5.713	16.210
SiO2	9.930	63.700
P2O5	0.029	0.042
S	0.003	0.008
K2O	0.693	3.481
CaO	0.561	5.281
TiO2	74.078	6.564
MnO	2.086	2.380
FeO	9.747	4.608
ZrO2	0.342	0.285
V2O3	0.960	0.073
Cr2O3	0.005	-
Total	105.616	103.415

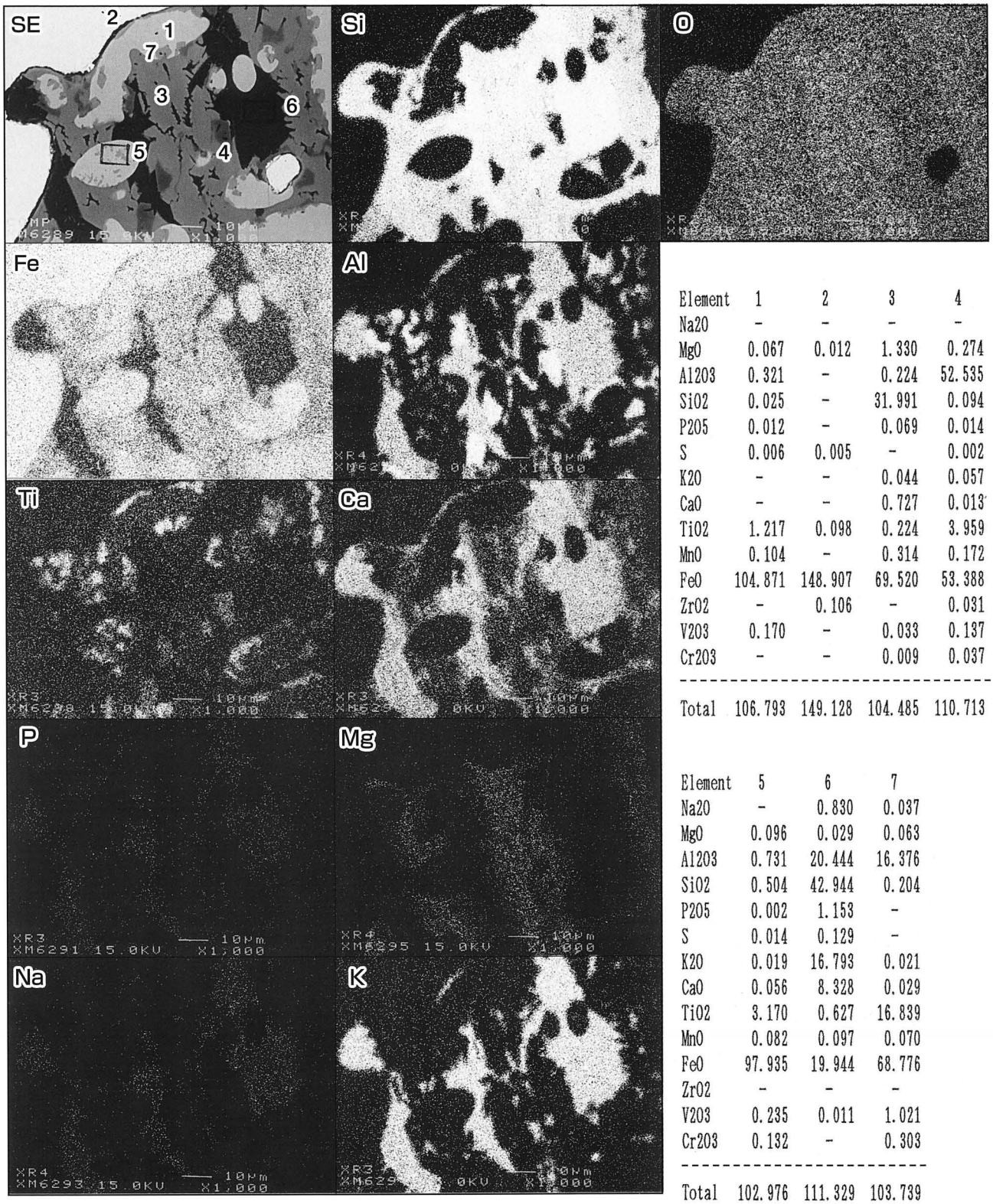
Photo.57　含鉄椀形滓(NAK-17-1)鉄中非金属介在物の特性X線像と定量分析値



Element	16
Na2O	0.214
MgO	0.469
Al2O3	14.796
SiO2	69.053
P2O5	0.025
S	0.014
K2O	4.646
CaO	4.658
TiO2	5.531
MnO	1.852
FeO	1.441
ZrO2	0.200
V2O3	0.055
Cr2O3	-
Total	102.954

Element	19
N	16.832
Ti	72.883
Mg	1.594
V	5.146
Fe	3.545
Total	100.000

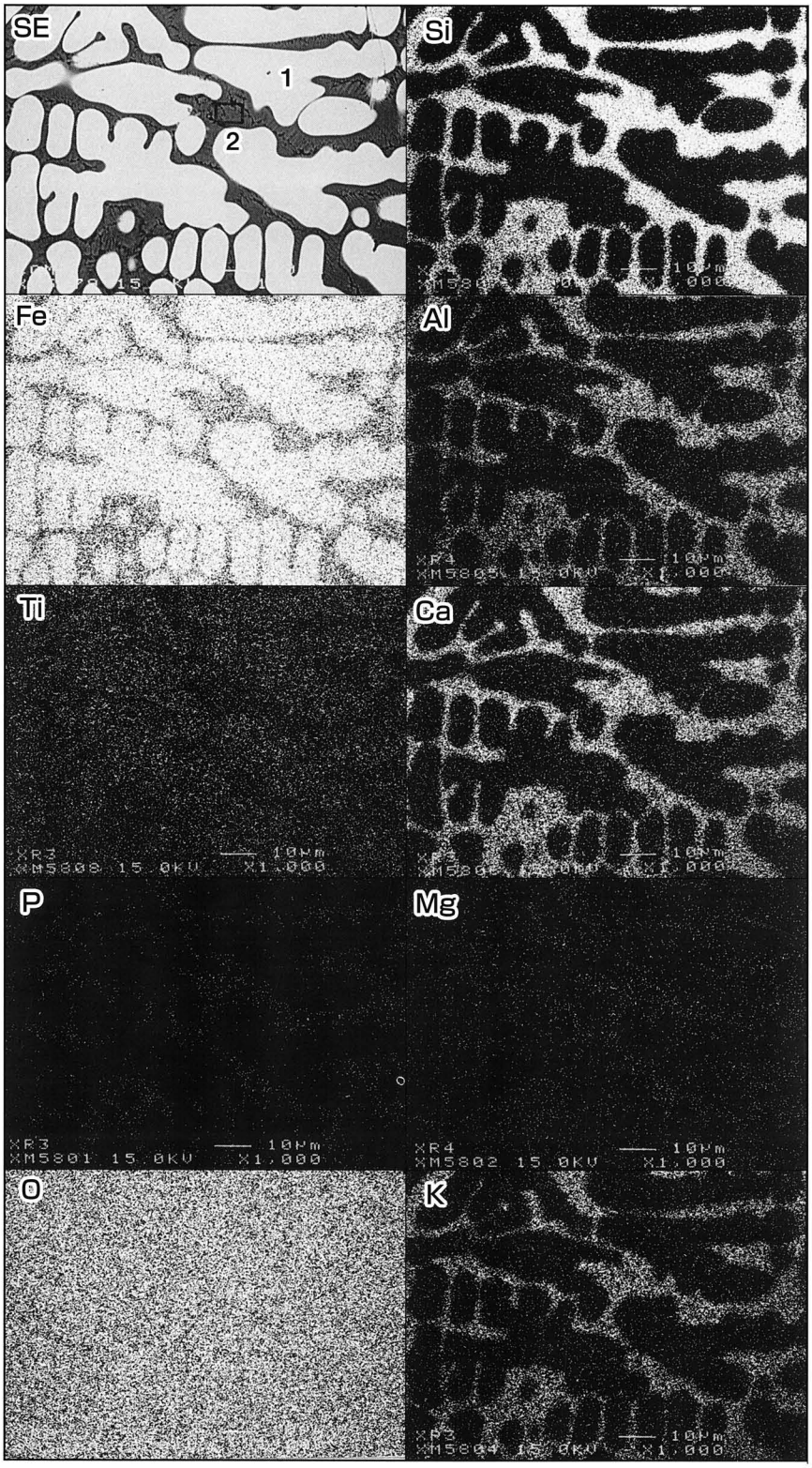
Photo.58　含鉄椀形滓(NAK-17-2)鉱物相の特性X線像と定量分析値



Element	1	2	3	4
Na2O	-	-	-	-
MgO	0.067	0.012	1.330	0.274
Al2O3	0.321	-	0.224	52.535
SiO2	0.025	-	31.991	0.094
P2O5	0.012	-	0.069	0.014
S	0.006	0.005	-	0.002
K2O	-	-	0.044	0.057
CaO	-	-	0.727	0.013
TiO2	1.217	0.098	0.224	3.959
MnO	0.104	-	0.314	0.172
FeO	104.871	148.907	69.520	53.388
ZrO2	-	0.106	-	0.031
V2O3	0.170	-	0.033	0.137
Cr2O3	-	-	0.009	0.037
Total	106.793	149.128	104.485	110.713

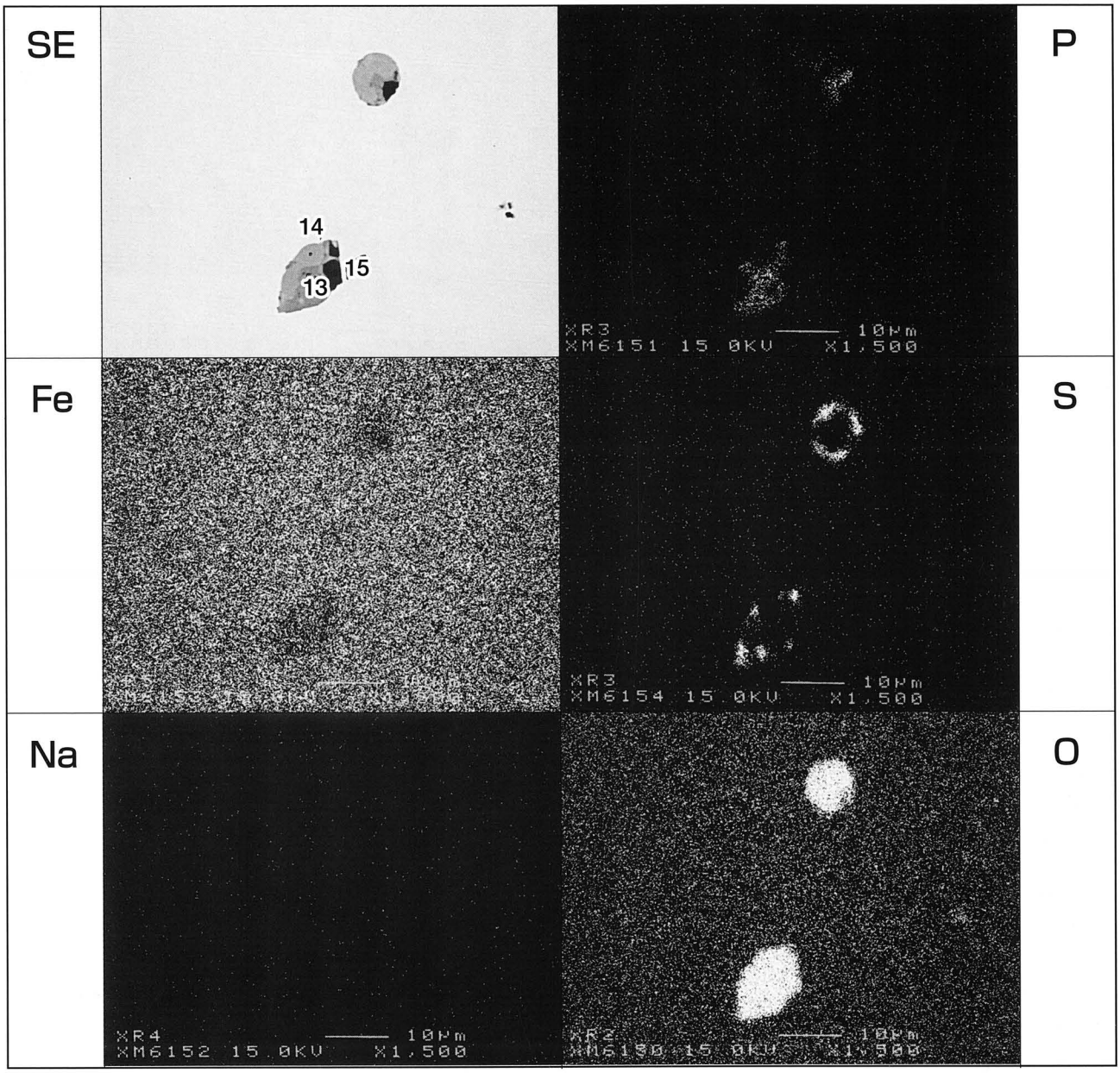
Element	5	6	7
Na2O	-	0.830	0.037
MgO	0.096	0.029	0.063
Al2O3	0.731	20.444	16.376
SiO2	0.504	42.944	0.204
P2O5	0.002	1.153	-
S	0.014	0.129	-
K2O	0.019	16.793	0.021
CaO	0.056	8.328	0.029
TiO2	3.170	0.627	16.839
MnO	0.082	0.097	0.070
FeO	97.935	19.944	68.776
ZrO2	-	-	-
V2O3	0.235	0.011	1.021
Cr2O3	0.132	-	0.303
Total	102.976	111.329	103.739

Photo.59　含鉄椀形滓(NAK-18)鉱物相の特性X線像と定量分析値



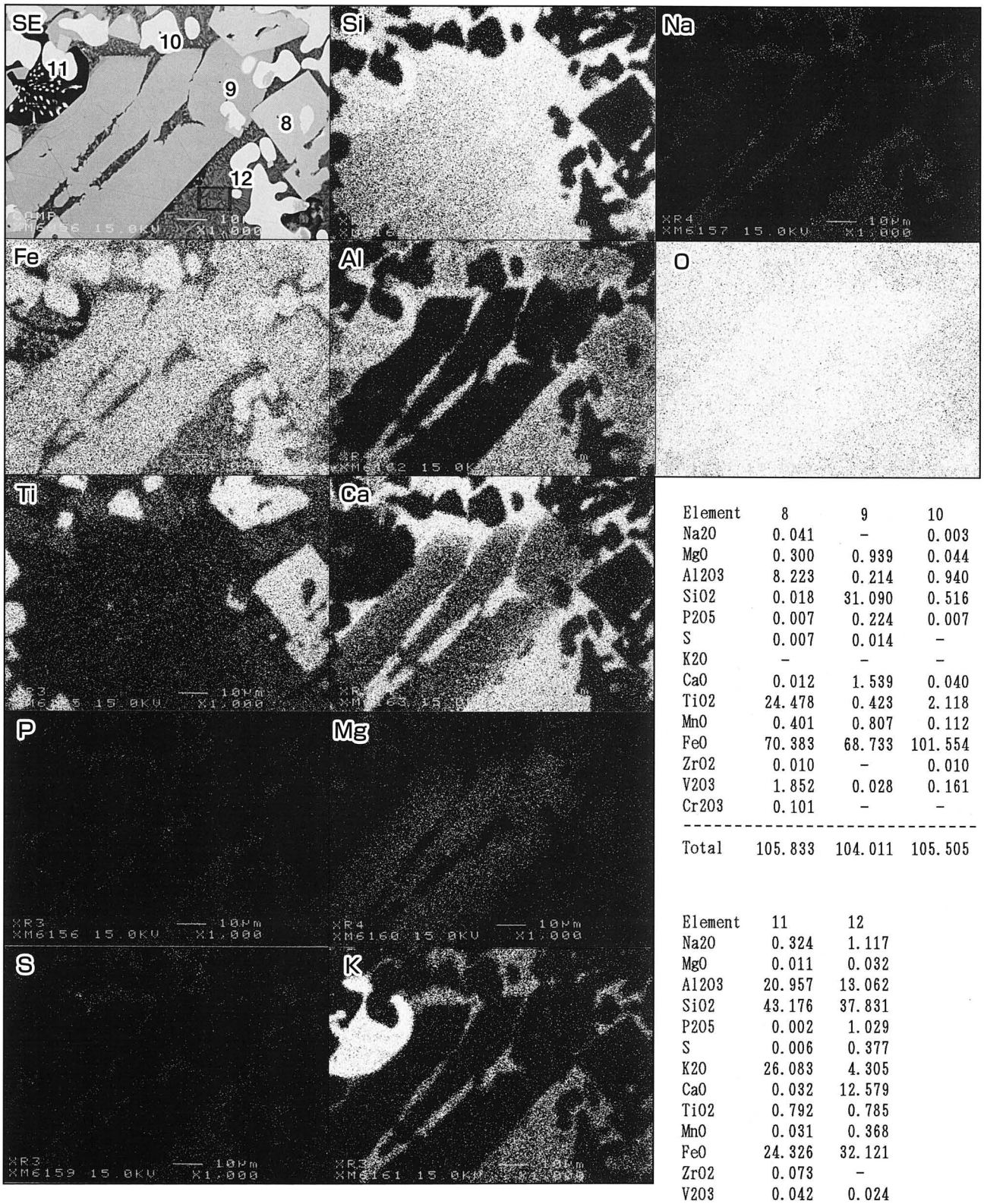
Element	1	2
Na2O	-	0.348
MgO	0.155	0.431
Al2O3	0.736	9.676
SiO2	0.013	4.483
P2O5	-	1.105
S	0.001	0.120
K2O	-	3.605
CaO	-	4.465
TiO2	1.208	0.348
MnO	0.018	0.160
FeO	100.358	51.144
ZrO2	-	0.040
V2O3	0.123	0.001
Cr2O3	0.020	0.022
Total	102.632	75.948

Photo.60　含鉄鉄滓(NAK-19)鉱物相の特性X線像と定量分析値



Element	13	14	15
Na2O	-	0.013	-
MgO	0.008	0.001	-
Al2O3	0.005	0.009	-
SiO2	0.017	0.010	0.079
P2O5	10.124	0.038	0.768
S	0.020	0.027	0.018
K2O	0.005	-	-
CaO	-	-	-
TiO2	0.063	0.065	0.023
MnO	0.179	0.144	-
FeO	93.106	105.736	90.570
ZrO2	-	0.108	-
V2O3	0.133	0.232	0.008
Cr2O3	-	0.110	0.055
Total	103.660	106.493	91.521

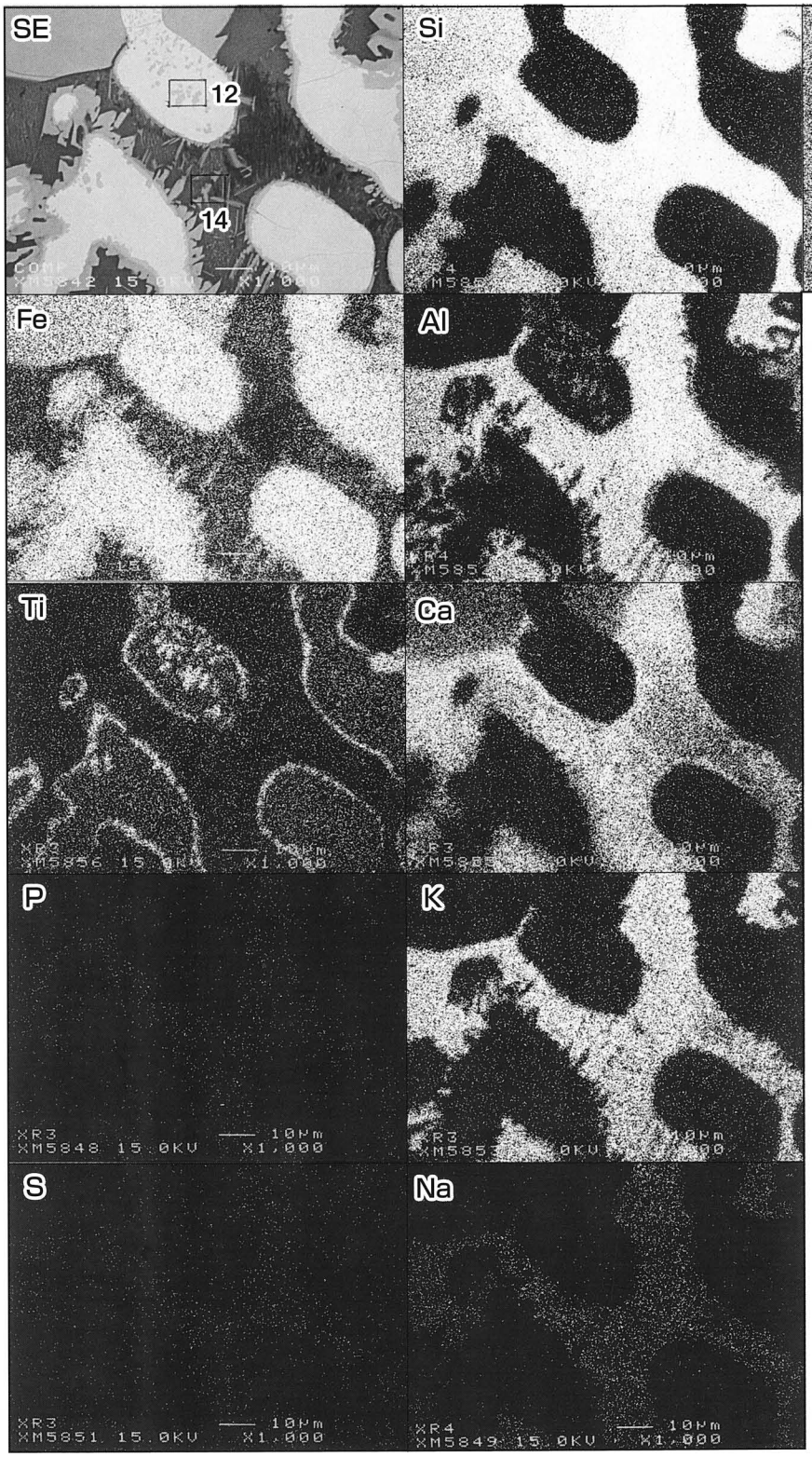
Photo.61　含鉄鉄滓(NAK-20-1)鉄中非金属介在物の特性X線像と定量分析値



Element	8	9	10
Na2O	0.041	-	0.003
MgO	0.300	0.939	0.044
Al2O3	8.223	0.214	0.940
SiO2	0.018	31.090	0.516
P2O5	0.007	0.224	0.007
S	0.007	0.014	-
K2O	-	-	-
CaO	0.012	1.539	0.040
TiO2	24.478	0.423	2.118
MnO	0.401	0.807	0.112
FeO	70.383	68.733	101.554
ZrO2	0.010	-	0.010
V2O3	1.852	0.028	0.161
Cr2O3	0.101	-	-
Total	105.833	104.011	105.505

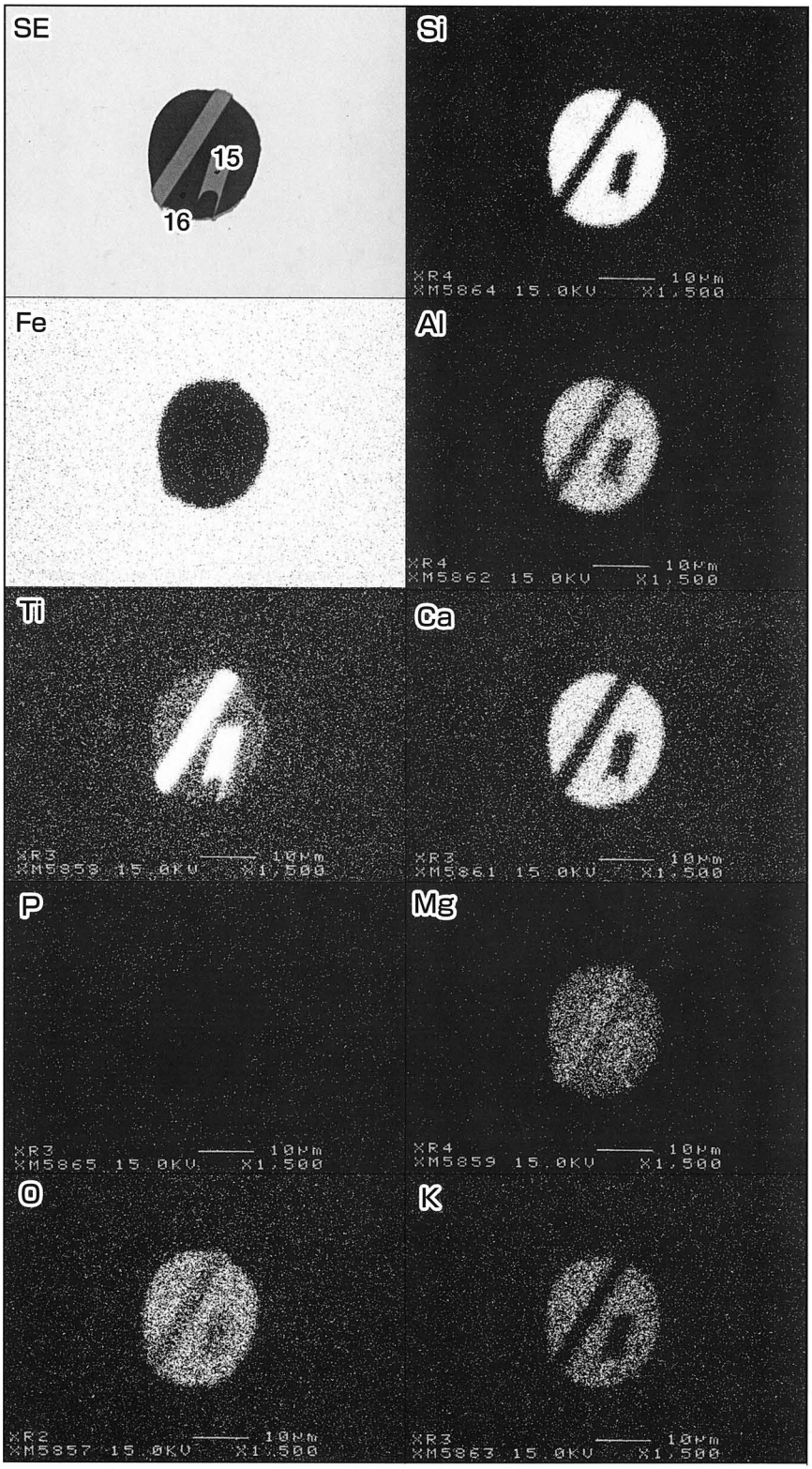
Element	11	12
Na2O	0.324	1.117
MgO	0.011	0.032
Al2O3	20.957	13.062
SiO2	43.176	37.831
P2O5	0.002	1.029
S	0.006	0.377
K2O	26.083	4.305
CaO	0.032	12.579
TiO2	0.792	0.785
MnO	0.031	0.368
FeO	24.326	32.121
ZrO2	0.073	-
V2O3	0.042	0.024
Cr2O3	0.010	-
Total	115.865	103.630

Photo.62　含鉄鉄滓(NAK-20-2)鉱物相の特性X線像と定量分析値



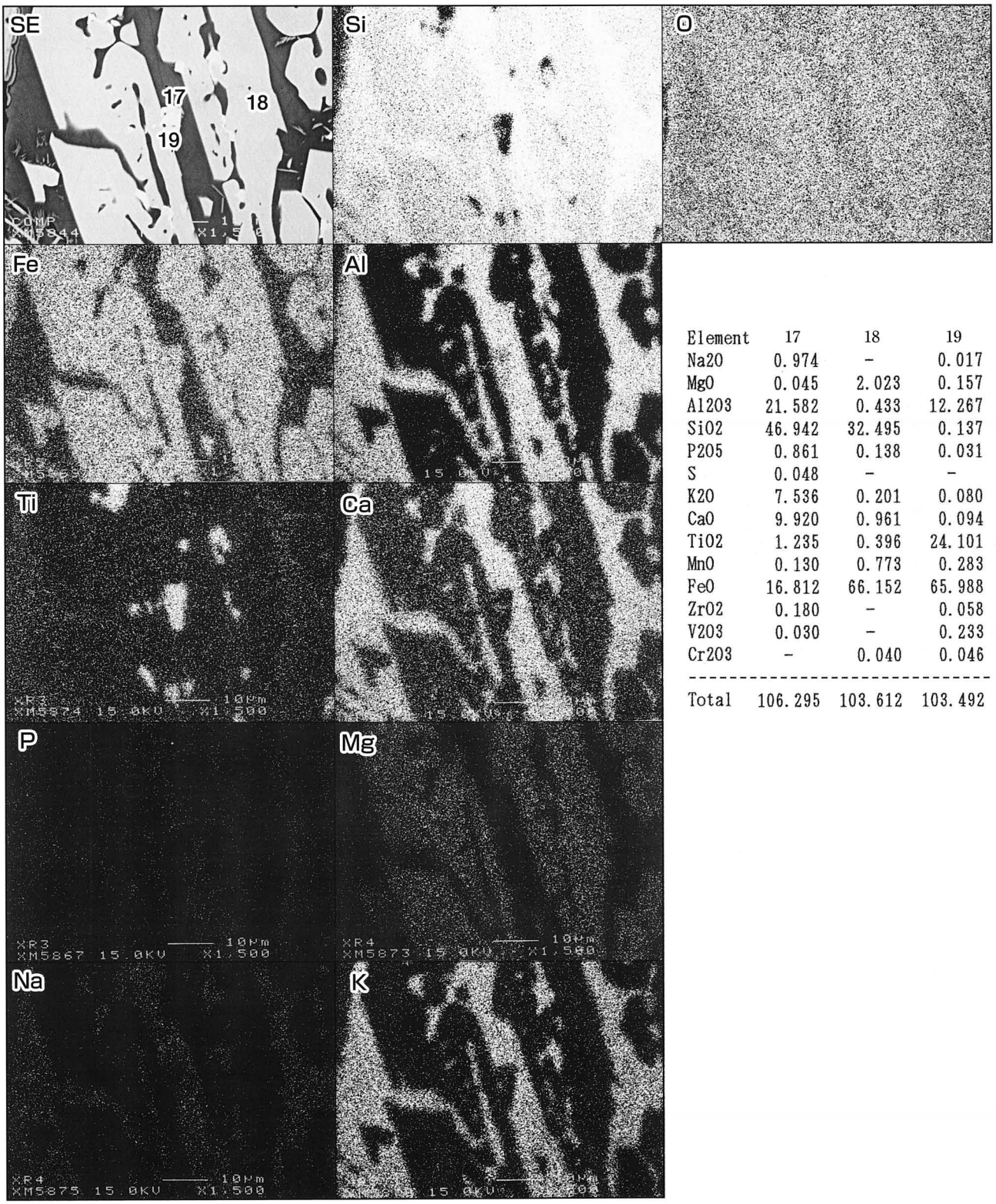
Element	12	13	14
Na2O	0.045	-	1.198
MgO	0.013	0.368	-
Al2O3	2.280	0.122	20.640
SiO2	0.144	31.930	43.319
P2O5	0.014	0.101	0.653
S	0.006	0.001	0.165
K2O	-	-	10.961
CaO	-	1.305	8.178
TiO2	5.658	0.174	0.416
MnO	0.159	0.682	0.146
FeO	95.629	71.579	20.089
ZrO2	0.156	0.041	0.074
V2O3	0.207	-	0.020
Cr2O3	0.069	0.004	0.010
Total	104.380	106.307	105.869

Photo.63　椀形鍛冶滓(NAK-23)鉱物相の特性X線像と定量分析値



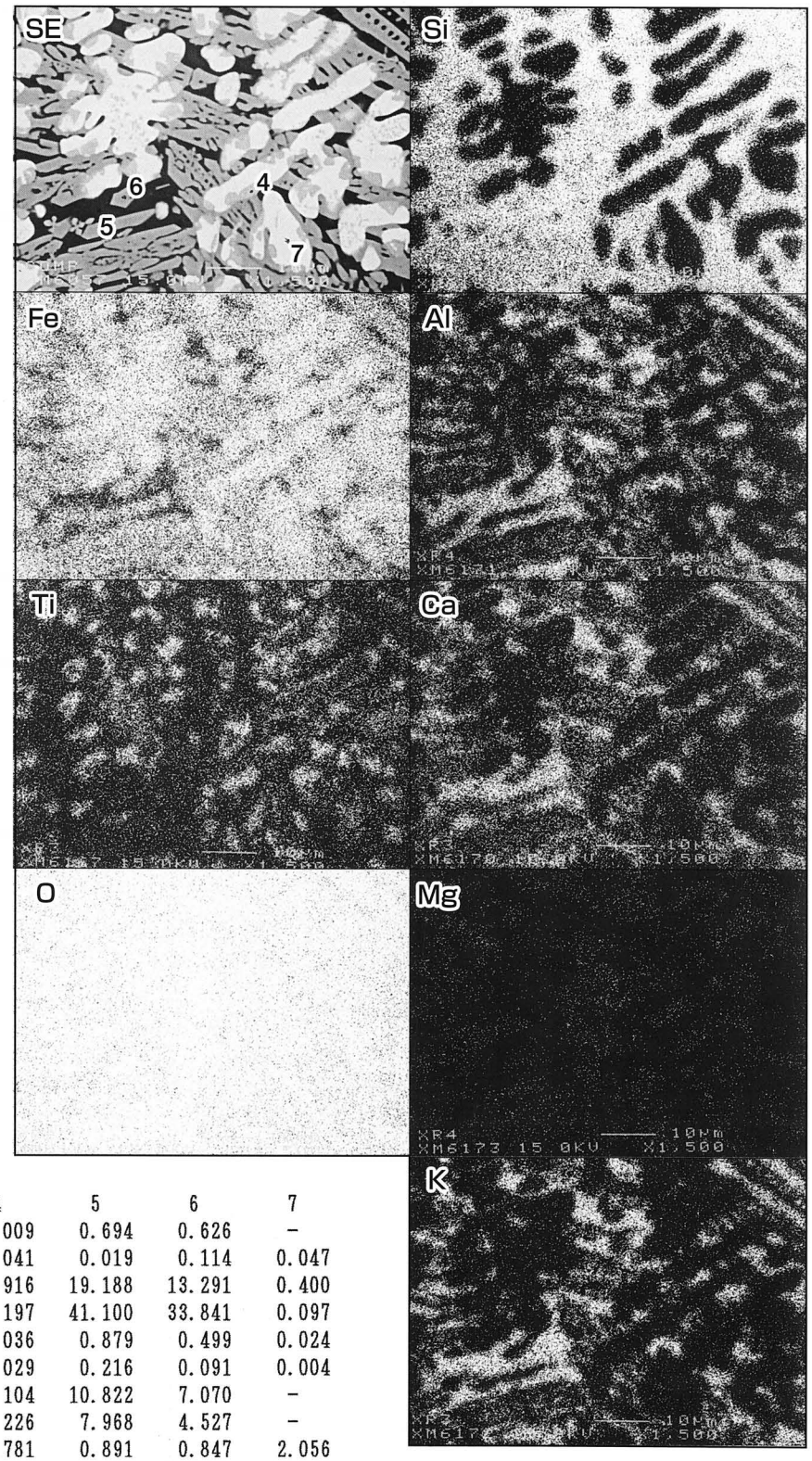
Element	15	16
Na2O	0.053	0.572
MgO	6.568	3.414
Al2O3	2.558	15.522
SiO2	0.048	57.473
P2O5	-	0.015
S	-	0.016
K2O	0.053	4.140
CaO	0.203	12.399
TiO2	89.042	5.520
MnO	0.530	0.835
FeO	4.063	2.486
ZrO2	0.260	0.355
V2O3	2.577	0.118
Cr2O3	0.060	0.022
Total	106.015	102.887

Photo.64　含鉄椀形滓（NAK-24-1）鉄中非金属介在物の特性X線像と定量分析値



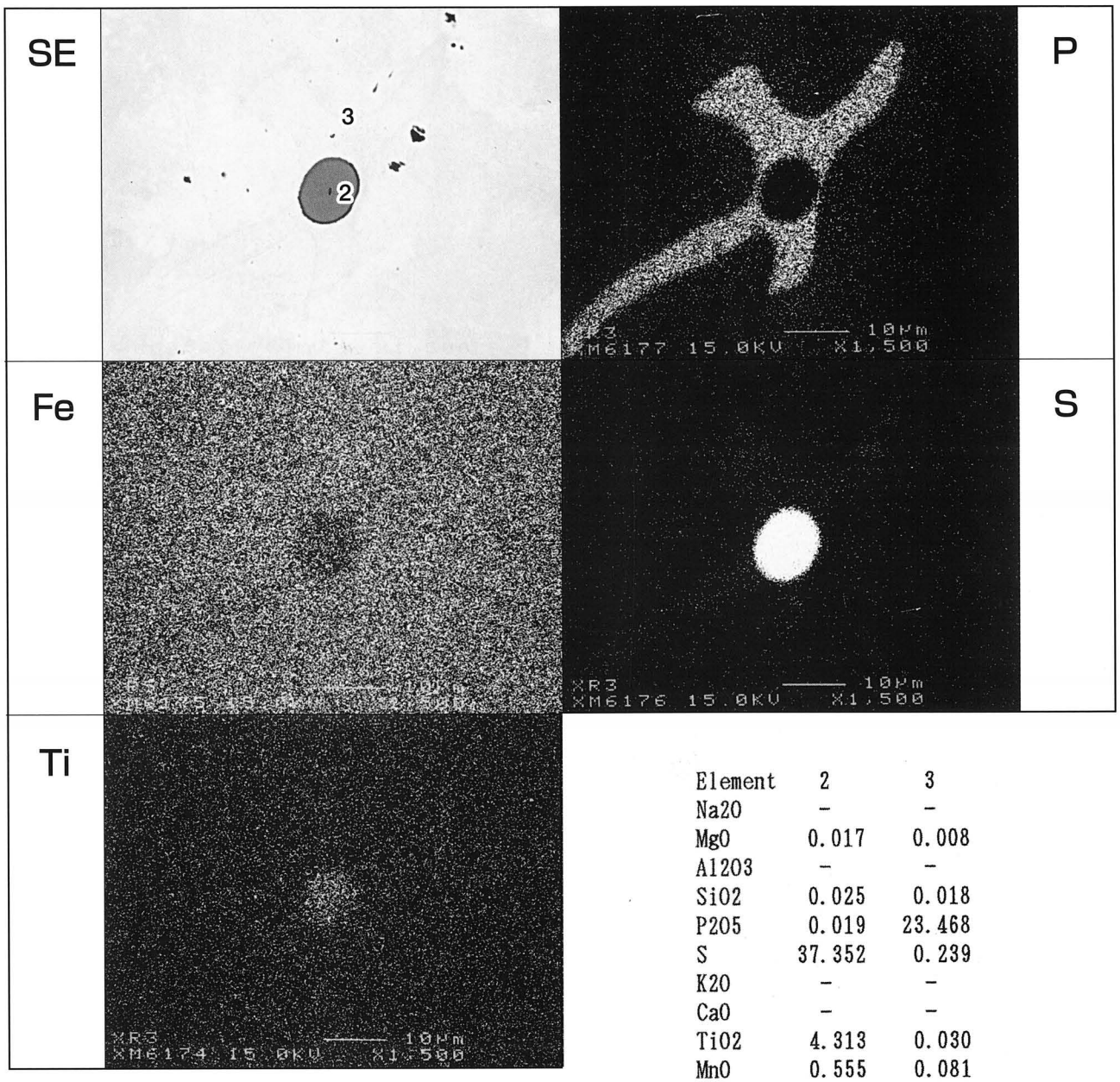
Element	17	18	19
Na2O	0.974	-	0.017
MgO	0.045	2.023	0.157
Al2O3	21.582	0.433	12.267
SiO2	46.942	32.495	0.137
P2O5	0.861	0.138	0.031
S	0.048	-	-
K2O	7.536	0.201	0.080
CaO	9.920	0.961	0.094
TiO2	1.235	0.396	24.101
MnO	0.130	0.773	0.283
FeO	16.812	66.152	65.988
ZrO2	0.180	-	0.058
V2O3	0.030	-	0.233
Cr2O3	-	0.040	0.046
Total	106.295	103.612	103.492

Photo.65　含鉄椀形滓(NAK-24-2)鉱物相の特性X線像と定量分析値



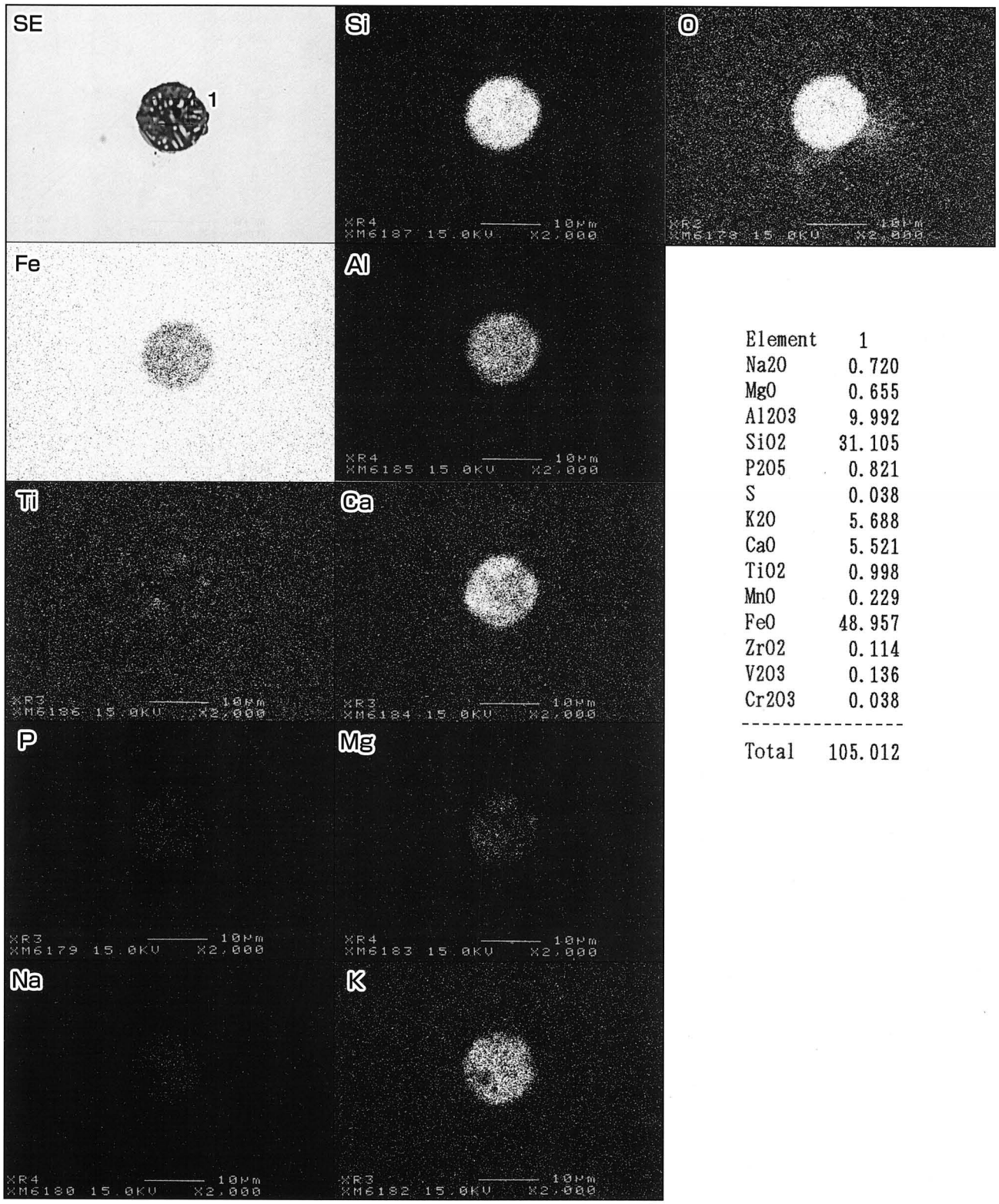
Element	4	5	6	7
Na2O	0.009	0.694	0.626	-
MgO	0.041	0.019	0.114	0.047
Al2O3	4.916	19.188	13.291	0.400
SiO2	0.197	41.100	33.841	0.097
P2O5	0.036	0.879	0.499	0.024
S	0.029	0.216	0.091	0.004
K2O	0.104	10.822	7.070	-
CaO	0.226	7.968	4.527	-
TiO2	9.781	0.891	0.847	2.056
MnO	0.193	0.227	0.276	0.151
FeO	87.045	25.264	44.849	100.328
ZrO2	0.059	0.115	-	0.020
V2O3	0.384	0.016	0.063	0.133
Cr2O3	-	0.010	-	-
Total	103.020	107.409	106.094	103.260

Photo.66　含鉄鉄滓(NAK-25-1)鉱物相の特性X線像と定量分析値



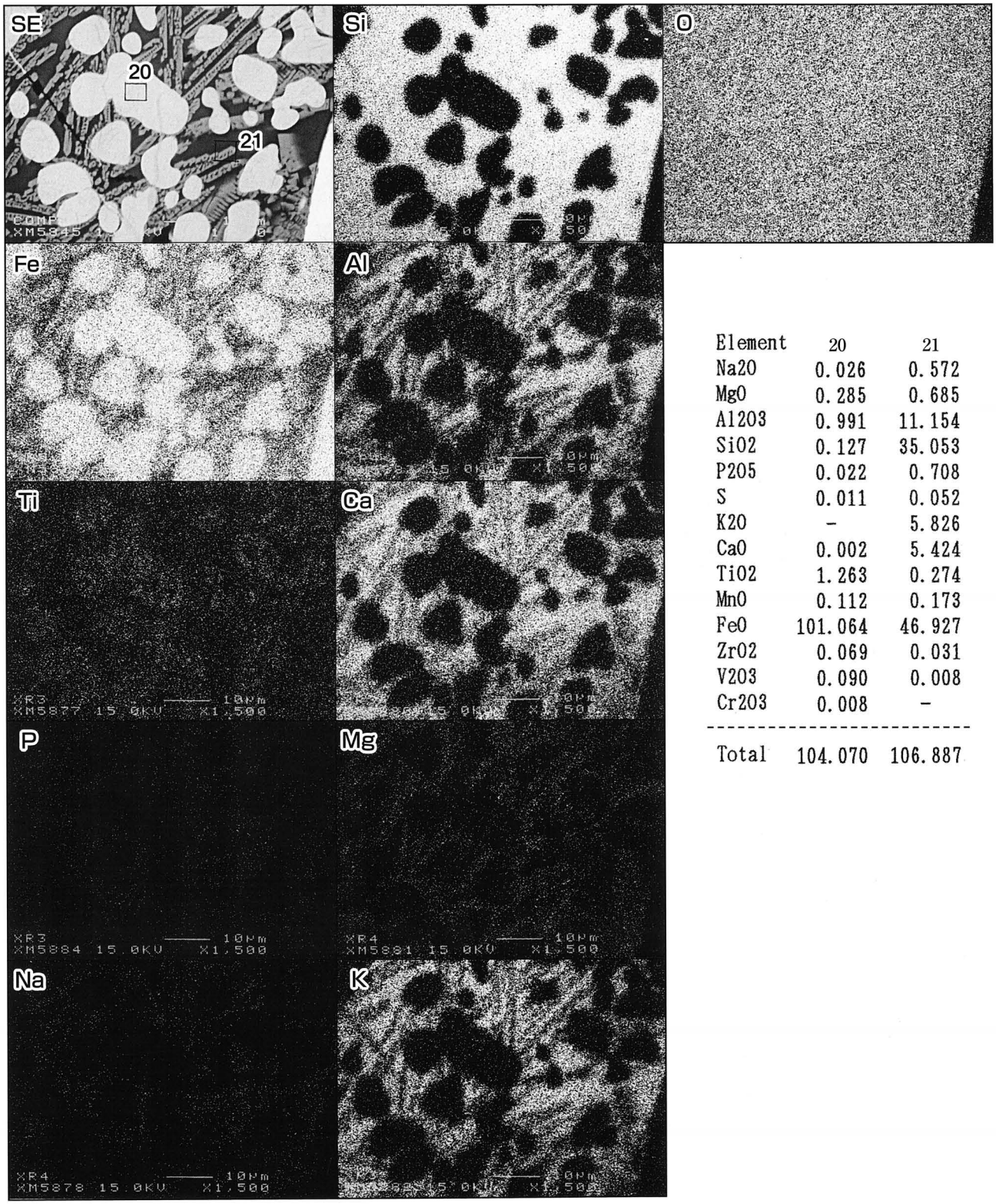
Element	2	3
Na2O	-	-
MgO	0.017	0.008
Al2O3	-	-
SiO2	0.025	0.018
P2O5	0.019	23.468
S	37.352	0.239
K2O	-	-
CaO	-	-
TiO2	4.313	0.030
MnO	0.555	0.081
FeO	84.707	132.071
ZrO2	-	0.135
V2O3	2.496	-
Cr2O3	0.166	-
Total	129.650	156.050

Photo.67　含鉄鉄滓(NAK-25-2)鉄中非金属介在物の特性X線像と定量分析値



Element	1
Na2O	0.720
MgO	0.655
Al2O3	9.992
SiO2	31.105
P2O5	0.821
S	0.038
K2O	5.688
CaO	5.521
TiO2	0.998
MnO	0.229
FeO	48.957
ZrO2	0.114
V2O3	0.136
Cr2O3	0.038
Total	105.012

Photo.68　粗鉄鋌(切鉄？)(NAK-26)鉄中非金属介在物の特性X線像と定量分析値



Element	20	21
Na2O	0.026	0.572
MgO	0.285	0.685
Al2O3	0.991	11.154
SiO2	0.127	35.053
P2O5	0.022	0.708
S	0.011	0.052
K2O	-	5.826
CaO	0.002	5.424
TiO2	1.263	0.274
MnO	0.112	0.173
FeO	101.064	46.927
ZrO2	0.069	0.031
V2O3	0.090	0.008
Cr2O3	0.008	-
Total	104.070	106.887

Photo.69　粗鉄鋌(切鉄？)(NAK-27)捲込スラグの特性X線像と定量分析値