

Fig. 1. EDS analysis map from internal part of pierced tube

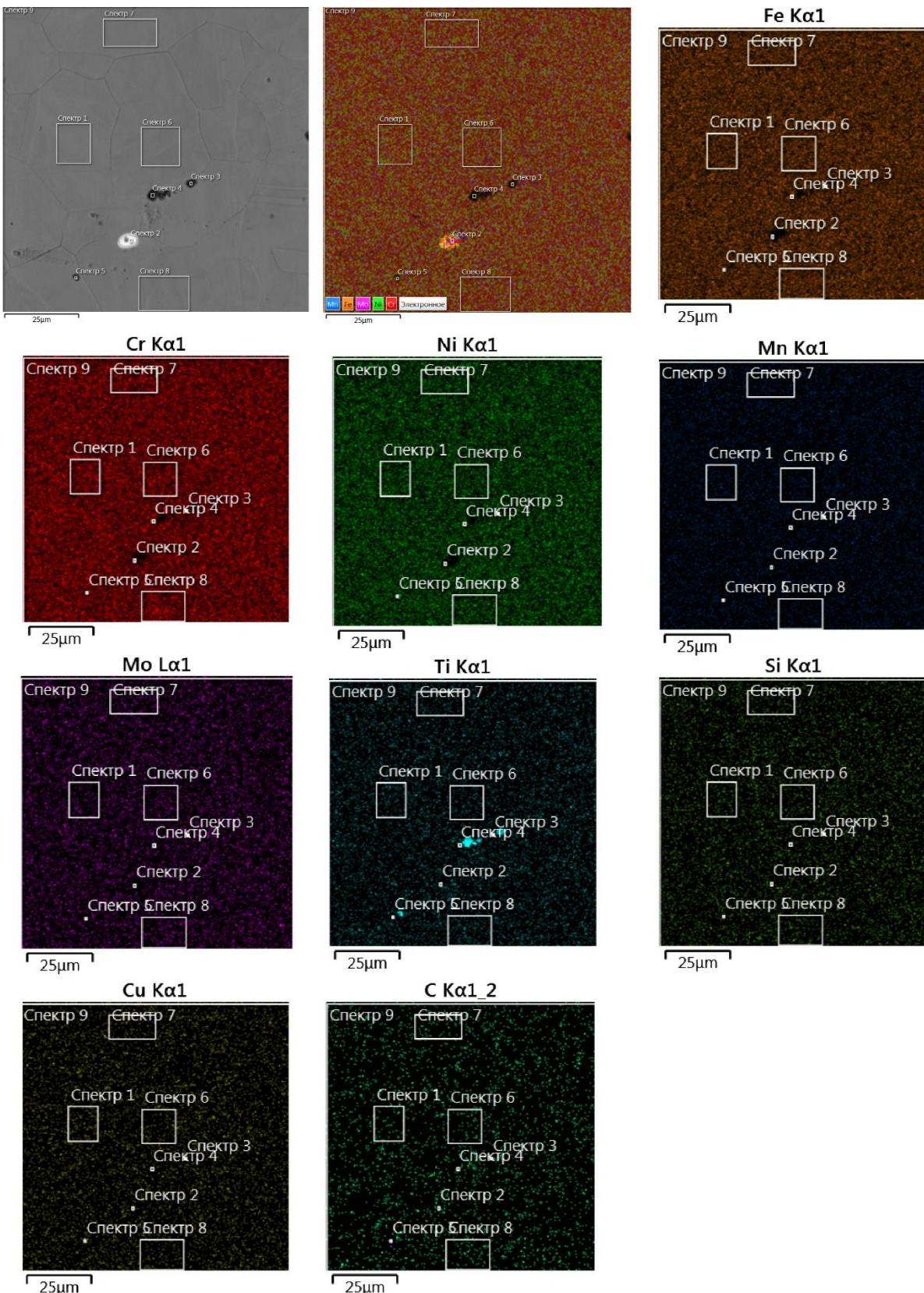


Fig. 2. EDS analysis map from external part of pierced tube

Table 1. EDS results element analysis from Internal area of pierced tube

Element	Weight. %	Atom. %
Cr	23.19	24.95
Ni	25.57	24.36
Ti	0.70	0.82
Mo	2.80	1.63
Cu	2.52	2.22
Fe	43.81	43.88
Si	0.58	1.15
Mn	0.70	0.72
Al	0.13	0.26
Total	100	100

Table 2. EDS results element analysis from external area of pierced tube

Element	Weight. %	Atom. %
Cr	23.19	24.95
Ni	25.57	24.36
Ti	0.79	0.82
Mo	2.87	1.63
Cu	2.76	2.22
Fe	43.41	43.88
Si	0.82	1.15
Mn	0.58	0.72
Total	100	100

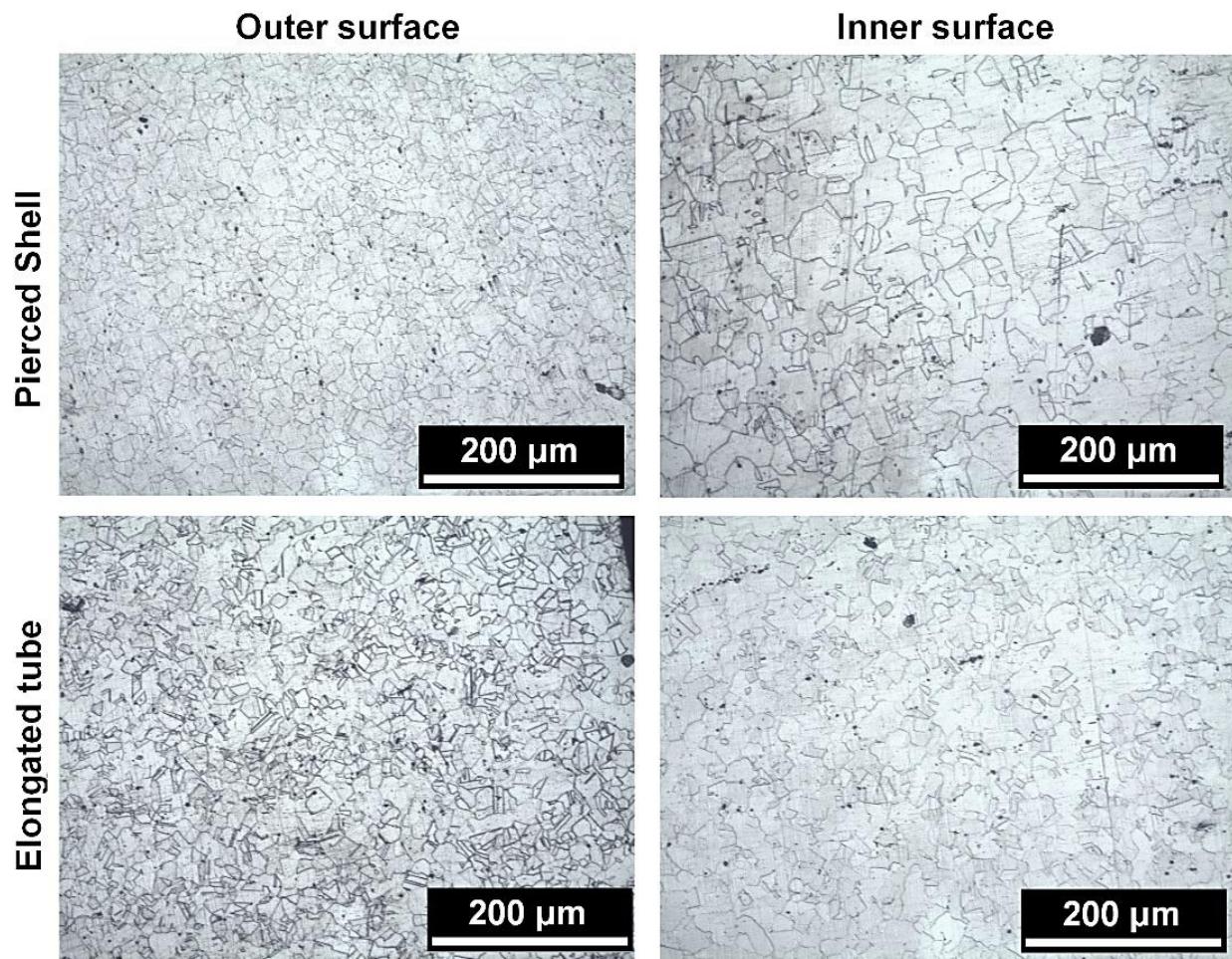


Fig. 3. Optic microstructure of samples, longitudinal section

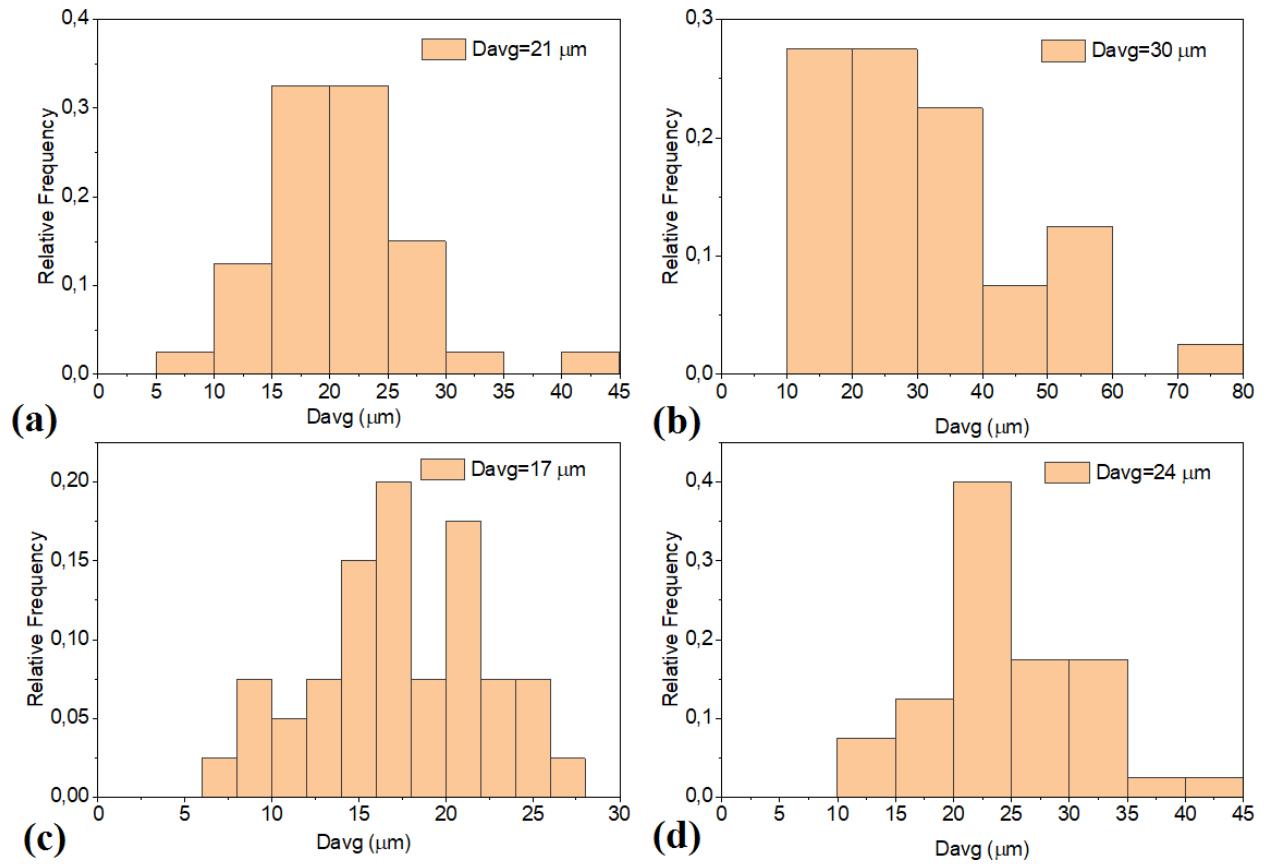


Fig. 4. Histograms of average grain size distribution within the longitudinal section for (a) external surface, and (b) internal surface of pierced shell. Histograms of average grain size distribution within the longitudinal section for (c) external surface, and (d) internal surface of elongated pipe.

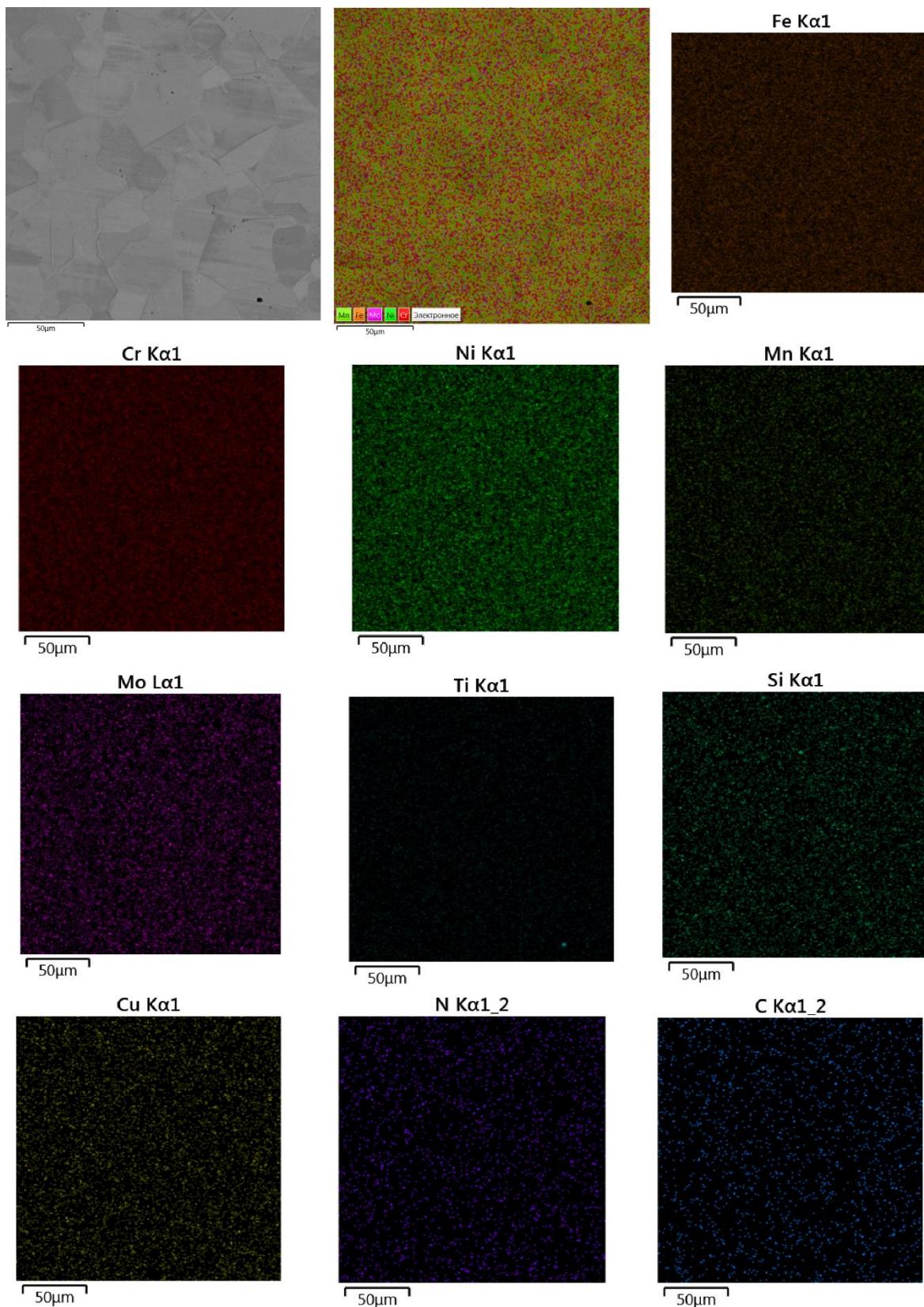


Fig. 5. EDS analysis map from internal part of elongated tube

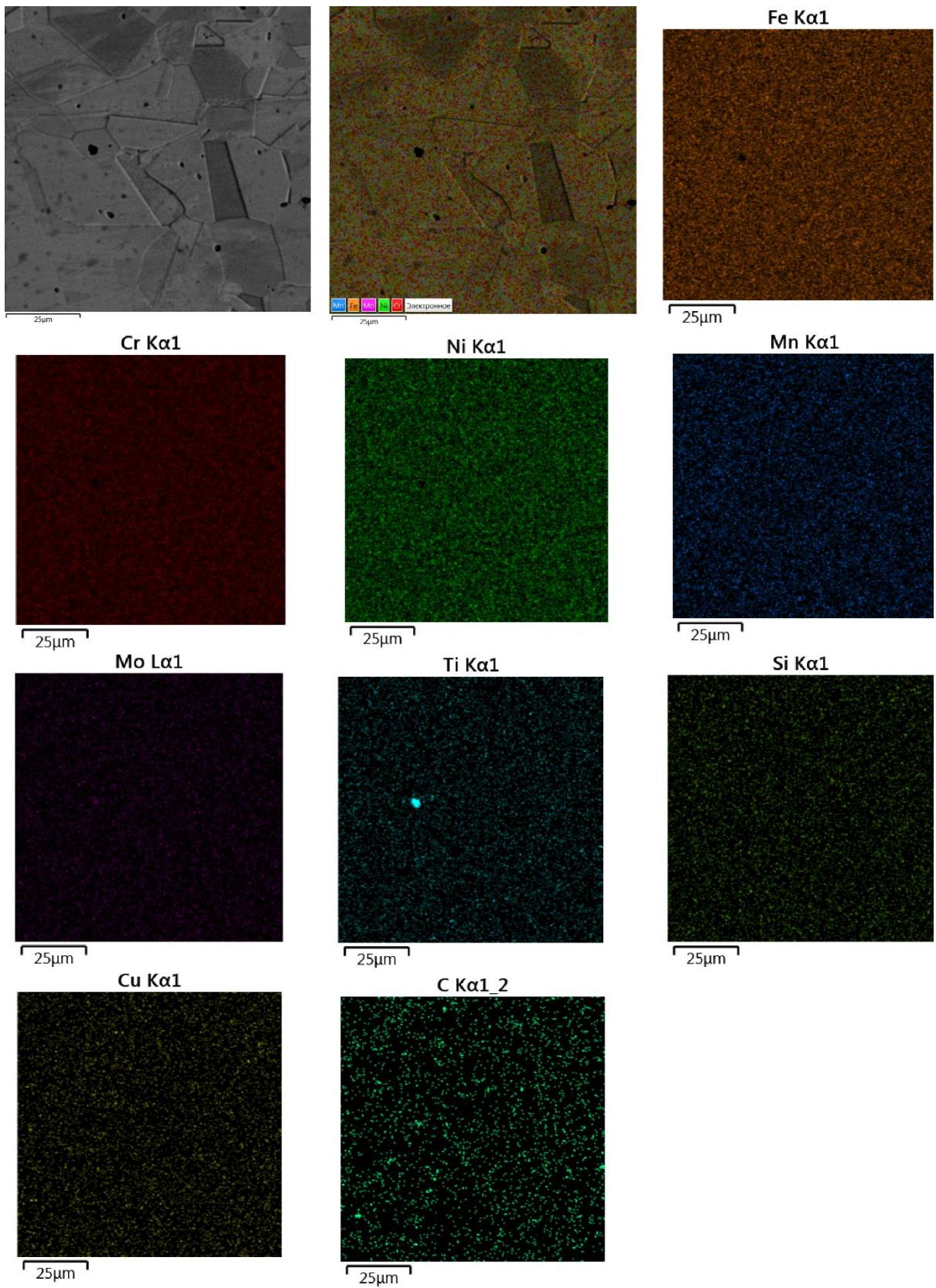


Fig. 6. EDS analysis map from external part of elongated tube

Table 3. EDS results element analysis from internal area of elongated tube

Element	Weight. %	Atom. %
Cr	23.25	25.06
Ni	25.82	24.66
Ti	0.68	0.79
Mo	2.89	1.69
Cu	2.72	2.40
Fe	43.32	43.48
Si	0.59	1.17
Mn	0.74	0.75
Total	100	100

Table 4. EDS results element analysis from external area of elongated tube

Element	Weight. %	Atom. %
Cr	23.17	24.97
Ni	25.69	24.52
Ti	0.68	0.80
Mo	2.83	1.65
Cu	2.60	2.29
Fe	43.62	43.77
Si	0.57	1.14
Mn	0.85	0.86
Total	100	100