

Esperienza di Laboratorio: SEM

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1 INTRODUZIONE

Dato un campione di Acciaio DUPLEX l'obiettivo è quello di usare il microscopio elettronico a scansione per individuare le due specie presenti

2 MATERIALI E TECNICHE SPERIMENTALI

3 DATI OTTENUTI

3.1 Composizione generale

Per riuscire ad identificare la composizione generale del campione sono state fatte tre misure su aree diverse in modo che facendo la media delle misurazioni abbiamo una buona idea sulla composizione di tutto il campione.

Table 3.1. Campionamento generale

Element	Atomic_number	Netto	Mass	Mass_Norm	Atom	Campione
Carbon	6	1553	0.00	0.00	0.00	1
Aluminium	13	695	0.00	0.00	0.00	1
Silicon	14	3255	0.46	0.47	0.94	1
Chromium	24	136889	24.79	25.62	27.41	1
Iron	26	218015	59.71	61.46	61.46	1
Nikel	28	21269	8.20	8.47	8.03	1
Molybdenum	42	18145	3.62	3.74	2.17	1

All'interno della tabella possiamo trovare i dati ricavati in particolare ci concentriamo su le colonne: **Element**, **Mass_Norm** e **Campione**. Facendo un grafico a barre possiamo visualizzare come sono distribuite le quantità degli elementi all'interno delle tre aree

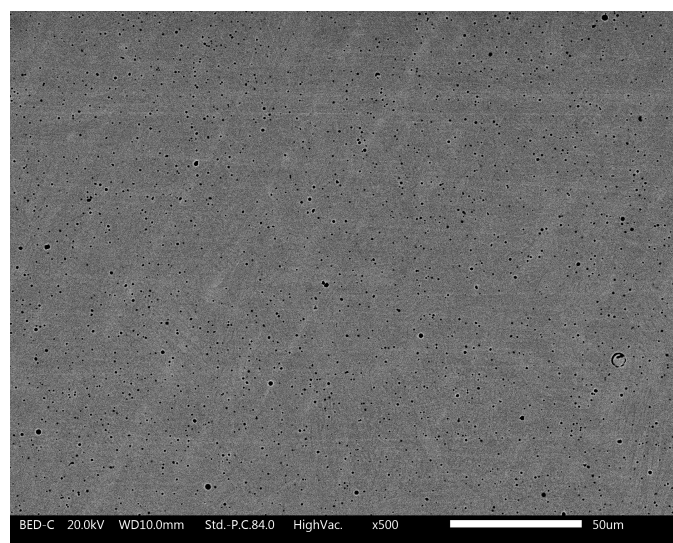
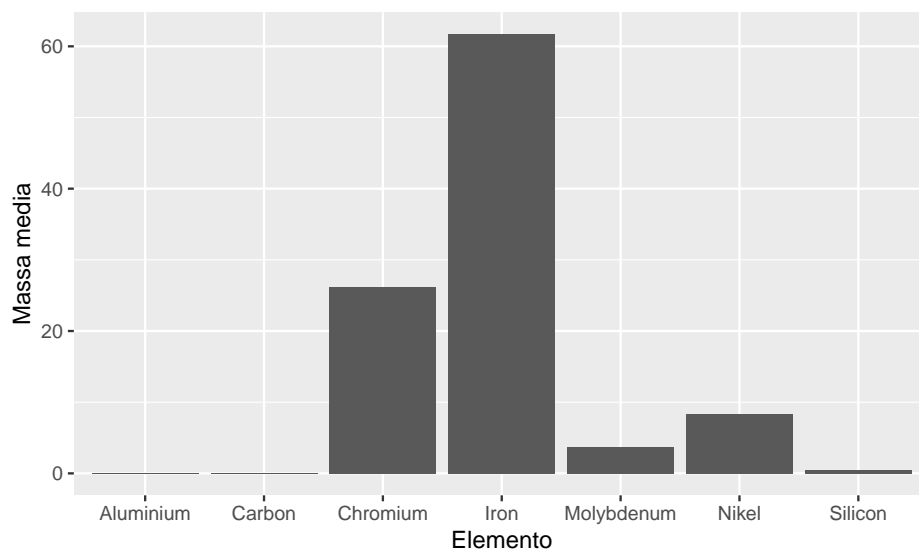
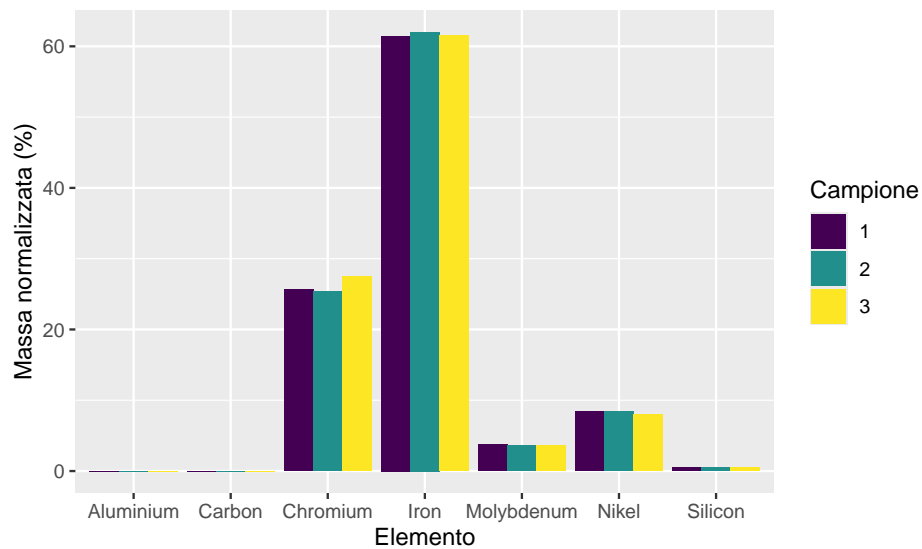


Table 3.2. Campionamento generale

Element	Mean
Carbon	0.00
Aluminium	0.00
Silicon	0.45
Chromium	26.15
Iron	61.69
Nikel	8.31
Molybdenum	3.68



3.2 Struttura delle fasi

Table 3.3. Campionamento fase chiara

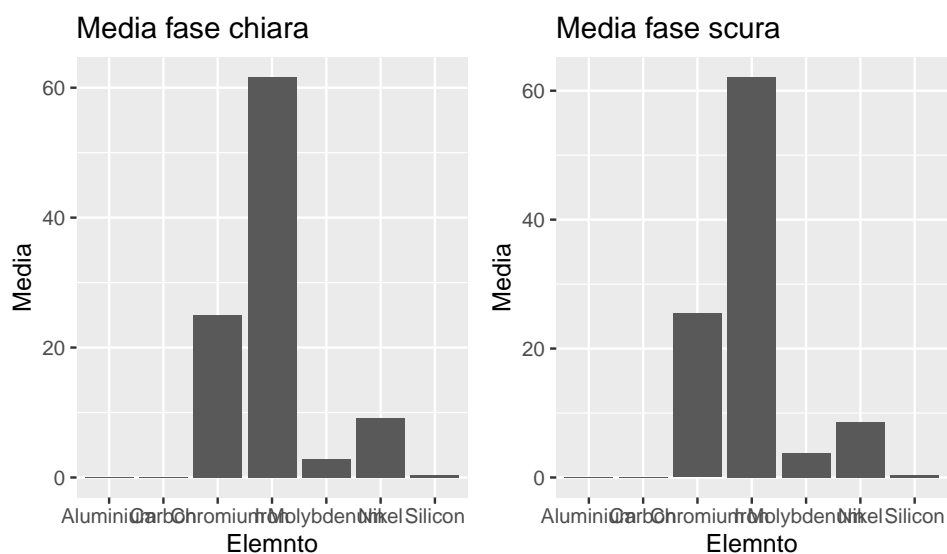
Element	Atomic_number	Mass	Mass_Norm	Atom	Campione
Carbon	6	0.00	0.00	0.00	1
Aluminium	13	0.00	0.00	0.00	1

Silicon	14	0.42	0.44	0.87	1
Chromium	24	23.98	25.00	26.76	1
Iron	26	59.09	61.60	61.39	1
Nikel	28	9.05	8.95	8.95	1
Molybdenum	42	3.38	2.04	2.04	1

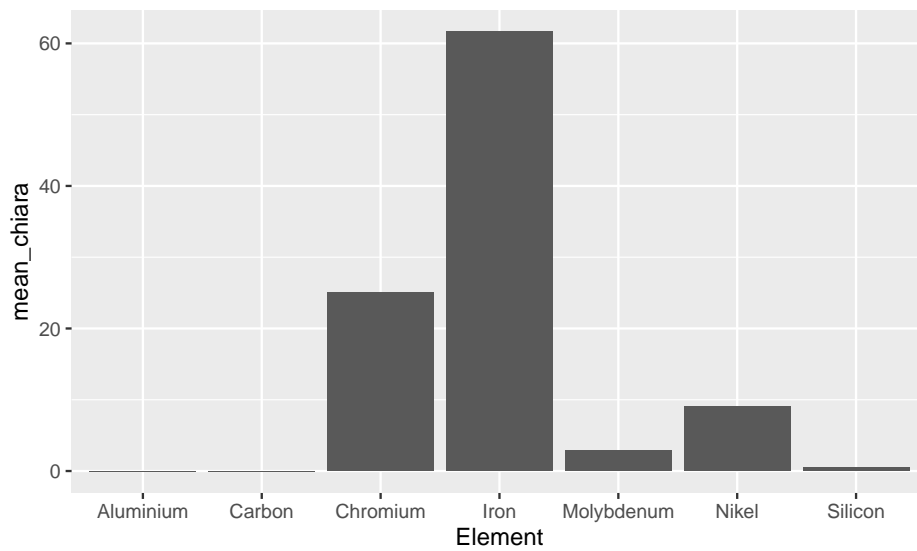
Table 3.4. Campionamento fase scura

Element	Atomic_number	Mass	Mass_Norm	Atom	Campione
Carbon	6	0.00	0.00	0.00	1
Aluminium	13	0.00	0.00	0.00	1
Silicon	14	0.47	0.49	0.97	1
Chromium	24	24.52	25.46	27.25	1
Iron	26	59.17	61.42	61.21	1
Nikel	28	8.49	8.81	8.35	1
Molybdenum	42	3.67	3.81	2.21	1

```
## # A tibble: 7 x 3
## # Groups:   Element [7]
##   Element    mean_chiara mean_scura
##   <chr>      <dbl>      <dbl>
## 1 Carbon      0          0
## 2 Aluminium  0          0
## 3 Silicon    0.43       0.46
## 4 Chromium   25.0       25.4
## 5 Iron       61.6       62.1
## 6 Nikel      9.12       8.57
## 7 Molybdenum 2.86       3.75
```



```
mean_fase %>%
  ggplot(aes(x = Element)) + geom_col(aes(y = mean_chiara),
    position = "dodge")
```



4 CONCLUSIONI

Table 4.1. Campionamento a tutto campo tabella completa

Element	Atomic_number	Netto	Mass	Mass_Norm	Atom	Campione
Carbon	6	1553	0.00	0.00	0.00	1
Aluminium	13	695	0.00	0.00	0.00	1
Silicon	14	3255	0.46	0.47	0.94	1
Chromium	24	136889	24.79	25.62	27.41	1
Iron	26	218015	59.71	61.46	61.46	1
Nikel	28	21269	8.20	8.47	8.03	1
Molybdenum	42	18145	3.62	3.74	2.17	1
Carbon	6	1553	0.00	0.00	0.00	2
Aluminium	13	695	0.00	0.00	0.00	2
Silicon	14	3255	0.42	0.44	0.87	2
Chromium	24	136889	24.49	25.39	27.17	2
Iron	26	218015	59.85	62.03	61.81	2
Nikel	28	21269	8.47	8.47	8.03	2
Molybdenum	42	18145	3.54	3.67	2.13	2
Carbon	6	1553	0.00	0.00	0.00	3
Aluminium	13	695	0.00	0.00	0.00	3
Silicon	14	3255	0.44	0.44	0.86	3
Chromium	24	136889	24.81	27.45	27.45	3
Iron	26	218015	59.80	61.58	61.58	3
Nikel	28	21269	8.16	7.99	7.99	3
Molybdenum	42	18145	3.52	3.64	2.11	3

Table 4.2. Campionamento fase chiara tabella completa

Element	Atomic_number	Mass	Mass_Norm	Atom	Mean	Campione
Carbon	6	0.00	0.00	0.00	0.00	1
Aluminium	13	0.00	0.00	0.00	0.00	1
Silicon	14	0.42	0.44	0.87	0.43	1
Chromium	24	23.98	25.00	26.76	24.99	1
Iron	26	59.09	61.60	61.39	61.61	1
Nikel	28	9.05	8.95	8.95	9.12	1
Molybdenum	42	3.38	2.04	2.04	2.86	1
Carbon	6	0.00	0.00	0.00	0.00	2
Aluminium	13	0.00	0.00	0.00	0.00	2
Silicon	14	0.42	0.44	0.87	0.43	2
Chromium	24	24.08	25.07	26.80	24.99	2
Iron	26	59.64	62.07	61.80	61.61	2
Nikel	28	8.71	9.07	8.59	9.12	2

Molybdenum	42	3.22	3.35	1.94	2.86	2
Carbon	6	0.00	0.00	0.00	0.00	3
Aluminium	13	0.00	0.00	0.00	0.00	3
Silicon	14	0.38	0.40	0.79	0.43	3
Chromium	24	23.72	24.91	26.64	24.99	3
Iron	26	59.19	61.16	61.88	61.61	3
Nikel	28	8.90	9.35	8.85	9.12	3
Molybdenum	42	3.02	3.18	1.84	2.86	3

Table 4.3. Campionamento fase scura tabella completa

Element	Atomic_number	Mass	Mass_Norm	Atom	Mean	Campione
Carbon	6	0.00	0.00	0.00	0.00	1
Aluminium	13	0.00	0.00	0.00	0.00	1
Silicon	14	0.47	0.49	0.97	0.46	1
Chromium	24	24.52	25.46	27.25	25.44	1
Iron	26	59.17	61.42	61.21	62.09	1
Nikel	28	8.49	8.81	8.35	8.57	1
Molybdenum	42	3.67	3.81	2.21	3.75	1
Carbon	6	0.00	0.00	0.00	0.00	2
Aluminium	13	0.00	0.00	0.00	0.00	2
Silicon	14	0.43	0.45	0.90	0.46	2
Chromium	24	24.45	25.49	27.28	25.44	2
Iron	26	59.34	62.86	61.63	62.09	2
Nikel	28	8.13	8.47	8.03	8.57	2
Molybdenum	42	3.57	3.72	2.13	3.75	2
Carbon	6	0.00	0.00	0.00	0.00	3
Aluminium	13	0.00	0.00	0.00	0.00	3
Silicon	14	0.43	0.45	0.89	0.46	3
Chromium	24	24.27	25.38	27.16	25.44	3
Iron	26	59.29	62.00	61.78	62.09	3
Nikel	28	8.07	8.44	8.00	8.57	3
Molybdenum	42	3.57	3.73	2.16	3.75	3