

EDX point analysis

Table S1. represents the cation ratio for each highlighted point in Figures 4-7. Only by correlating the cation ratio with XRD spectra, individual oxide species can be identified since, for example, EDX cannot detect lithium. Furthermore, signals from anions used for quantification overlap with cation signals which pose an error. Indications of the respective phases labeled in Figures 4-7 result from the correlation of EDX and XRD results.

Table S1. EDX point analysis in Figures 4-7 measured in at% only cations normalized to 100%, counterions are added without quantification.

| Point | Ni | Cr | Fe | Al | Si | Na | K | Mn | V | Counterion |
|-------|------|------|------|------|------|-----|------|-----|-----|---------------------------|
| 1 | 2.7 | 72.2 | 16.3 | 2.0 | 2.7 | - | 4.2 | - | - | O |
| 2 | | 10.9 | 26.4 | 13.7 | 40.1 | 1.8 | 6.7 | 0.5 | | O |
| 3 | 3.4 | 12.0 | 16.5 | 41.6 | 6.3 | 4.7 | 15.6 | - | - | O, minor amount of sulfur |
| 4 | 3.1 | 65.4 | 20.5 | 2.5 | 2.5 | 0.5 | 3.6 | - | 1.9 | O |
| 5 | 3.6 | 56.1 | 35.3 | - | 3.6 | | 1.3 | - | - | O |
| 6 | 59.5 | 10.0 | 22.2 | - | 2.2 | 4.1 | 1.8 | 0.3 | | O |
| 7 | | 56.4 | 39.2 | - | 3.3 | - | - | 0.5 | 0.7 | C |
| 8 | 3.2 | 68.2 | 26.6 | - | 1.2 | - | - | 0.6 | 0.2 | O |