**Supplementary Material 3** Microprobe wt% for minerals in SMU-LT

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Pseudorutile**  Grain 1 | | **Pseudorutile**  Grain 2 | | **Ilmenite**  Grain 1 | | | | **Zircon**  Grain 1 | |
| **Oxide** | **1** | **2** | **1** | **2** | **1** | **2** | **3** | **4** | **1** | **2** |
| SiO2 | 0.659 | 1.043 | 0.54 | 0.686 | 0.111 | 0.079 | 0.182 | 0.123 | 34.63 | 34.979 |
| MgO | 2.988 | 3.57 | 3.419 | 3.245 | 0.799 | 1.01 | 0.686 | 0.705 | 0 | 0.014 |
| TiO2 | 68.021 | 63.875 | 64.781 | 67.264 | 52.728 | 53.215 | 53.048 | 52.968 | 0 | 0 |
| Cr2O3 | 0.297 | 0.251 | 0.212 | 0.346 | 0.017 | 0 | 0.019 | 0 |  |  |
| SO3 | 0 | 0.214 |  |  |  |  |  |  |  |  |
| Na2O | 0.079 | 0.053 |  |  | 0.019 | 0.017 | 0.055 | 0.035 |  |  |
| Al2O3 | 0.187 | 0.318 | 0.148 | 0.484 | 0.031 | 0.006 | 0.029 | 0.025 | 0.006 | 0.022 |
| CaO | 0.581 | 0.588 | 0.511 | 0.592 | 0.146 | 0.115 | 0.166 | 0.17 | 0.029 | 0.008 |
| K2O | 0.062 | 0.064 |  |  |  |  |  |  |  |  |
| P2O5 | 0.015 | 0 |  |  |  |  |  |  |  |  |
| FeO | 13.789 | 14.633 | 15.897 | 14.832 | 34.788 | 38.402 | 33.558 | 32.508 | 0.109 | 0 |
| MnO | 0.141 | 0.123 | 0.162 | 0.169 | 1.056 | 1.282 | 0.876 | 0.946 | 0.036 | 0 |
| NiO | 0.039 | 0.039 | 0.062 | 0 | 0 | 0.021 | 0 | 0.007 |  |  |
| ZrO2 |  |  |  |  |  |  |  |  | 68.089 | 70.051 |
| HfO2 |  |  |  |  |  |  |  |  | 0.223 | 0.378 |
| PbO |  |  |  |  |  |  |  |  | 0.064 | 0 |
| Total | 86.858 | 84.771 | 85.732 | 87.618 | 89.695 | 94.147 | 88.619 | 87.487 | 103.186 | 105.452 |