**Table S4:** Micromechanical particle deformation process with depth

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Depth | Sample | EE | EF | FF | Elongate particle bending | Cross particle fracture |
| 1.24 | SN-1 | Rare | Abundant | Common | Rare | Absent |
| 5.10 | SN-2 | Rare | Abundant | Common | Rare | Absent |
| 6.25 | SN-34 | Rare | Common | Abundant | Rare | Absent |
| 7.21 | SN-35 | Rare | Common | Abundant | Rare | Absent |
| 9.18 | SN-3 | Rare | Common | Abundant | Rare | Absent |
| 10.69 | SN-4 | Rare | Common | Abundant | Rare | Absent |
| 14.28 | SN-36 | Rare | Common | Abundant | Rare | Absent |
| 26.05 | SN-5 | Rare | Common | Abundant | Rare | Absent |
| 28.00 | SN-6 | Rare | Rare | Abundant | Rare | Absent |
| 28.12 | SN-37 | Rare | Common | Abundant | Rare | Rare |
| 50.82 | SN-38 | Rare | Rare | Abundant | Rare | Absent |
| 63.24 | SN-7 | Rare | Rare | Abundant | Rare | Absent |
| 74.07 | SN-8 | Rare | Rare | Abundant | Rare | Absent |
| 83.02 | SN-39 | Rare | Rare | Abundant | Rare | Absent |
| 87.98 | SN-9 | Rare | Rare | Abundant | Rare | Absent |
| 92.82 | SN-41 | Rare | Rare | Abundant | Rare | Absent |
| 98.25 | SN-10 | Rare | Common | Abundant | Common | Absent |
| 111.10 | SN-11 | Rare | Rare | Abundant | Common | Rare |
| 117.13 | SN-40 | Rare | Rare | Abundant | Rare | Absent |
| 176.50 | SN-12 | Rare | Rare | Abundant | Rare | Absent |
| 182.62 | SN-42 | Rare | Rare | Abundant | Common | Absent |
| 226.70 | SN-13 | Rare | Rare | Abundant | Common | Absent |
| 285.51 | SN-43 | Rare | Rare | Abundant | Rare | Absent |
| 369.19 | SN-14 | Rare | Rare | Abundant | Common | Absent |
| 394.01 | SN-44 | Rare | Rare | Abundant | Common | Absent |
| 426.68 | SN-15 | Rare | Rare | Abundant | Common | Absent |
| 486.72 | SN-45 | Rare | Rare | Abundant | Rare | Absent |
| 505.32 | SN-16 | Rare | Rare | Abundant | Common | Absent |
| 592.42 | SN-17 | Rare | Rare | Abundant | Common | Absent |
| 621.2 | SN-46 | Rare | Rare | Abundant | Rare | Absent |
| 630.55 | SN-18 | Rare | Common | Abundant | Common | Rare |
| 737.39 | SN-19 | Rare | Rare | Abundant | Rare | Rare |
| 737.47 | SN-47 | Rare | Rare | Abundant | Rare | Absent |
| 751.16 | SN-20 | Rare | Rare | Abundant | Common | Absent |
| 776.17 | SN-21 | Rare | Rare | Abundant | Common | Absent |
| 802.55 | SN-22 | Rare | Rare | Abundant | Rare | Absent |
| 841.56 | SN-48 | Rare | Rare | Abundant | Common | Absent |
| 871.87 | SN-23 | Rare | Rare | Abundant | Common | Rare |
| 929.81 | SN-24 | Rare | Rare | Abundant | Rare | Rare |
| 959.15 | SN-49 | Rare | Rare | Abundant | Rare | Rare |
| 971.26 | SN-25 | Rare | Rare | Abundant | Abundant | Rare |
| 1026.3 | SN-50 | Rare | Rare | Abundant | Common | Absent |
| 1027.9 | SN-26 | Rare | Rare | Abundant | Common | Absent |
| 1095.7 | SN-27 | Rare | Rare | Abundant | Common | Absent |
| 1119.7 | SN-28 | Rare | Rare | Abundant | Common | Rare |
| 1145.9 | SN-51 | Rare | Rare | Abundant | Rare | Absent |
| 1172.8 | SN-29 | Rare | Rare | Abundant | Common | Rare |
| 1184.3 | SN-30 | Rare | Rare | Abundant | Common | Absent |
| 1233.1 | SN-31 | Rare | Rare | Abundant | Common | Rare |
| 1251.5 | SN-52 | Rare | Rare | Abundant | Rare | Absent |
| 1267.1 | SN-32 | Rare | Rare | Abundant | Abundant | Rare |
| 1299.3 | SN-33 | Rare | Rare | Abundant | Abundant | Absent |
| 1358.9 | SN-53 | Rare | Rare | Abundant | Common | Absent |
| 1432.5 | SN-54 | Rare | Rare | Abundant | Common | Absent |