附表1 柳树湾铀矿岩石主量元素特征表（×10-2）

Table 1 Major (wt%) element data of Liushuwan uranium deposit

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样号 | ZK3701-61 | ZK3701-102 | ZK3701-133 | 2017HCZ-Sc-1 | 2017HCZ-Sm-1 | ZK0501-45 | ZK0501-49 | ZK0501-104 | ZK1001-153 | ZK0001-64 | ZK1601-199 | ZK1601-215 | ZK5401-38 | ZK5401-40 | ZK5401-49 | ZK5401-57 | ZK5401-65 | QL0715-2 | QL1515-4 | QL1516 |
| SiO2 | 71.79 | 70.9 | 71.27 | 68.55 | 72.46 | 81.46 | 75.05 | 73.72 | 70.94 | 82.17 | 69.26 | 73.35 | 71.63 | 72.59 | 72.46 | 72.15 | 60.15 | 50.91 | 44.82 | 71.91 |
| Al2O3 | 15.15 | 15.26 | 15.13 | 15.15 | 14.98 | 10.11 | 13.53 | 14.16 | 15.9 | 8.2 | 14.96 | 14.65 | 14.1 | 14.93 | 15.18 | 14.89 | 21.16 | 13.32 | 19.2 | 14.29 |
| Fe2O3 | 0.02 | 0.16 | 0.15 | 0.74 | 0.34 | 0.16 | 0.03 | 0.06 | 0.04 | 0.07 | 0.4 | 0.33 | 0.18 | 0.09 | 0.08 | 0.05 | 0.72 | 13.62 | 10.91 | 2.4 |
| FeO | 1.32 | 1.07 | 1.25 | 1.64 | 0.58 | 0.31 | 0.2 | 1.09 | 1.32 | 0.68 | 1.52 | 0.81 | 0.62 | 1.44 | 1.22 | 1.37 | 1.99 |
| CaO | 1.8 | 2.05 | 2.33 | 3.09 | 0.99 | 1.02 | 0.41 | 1.57 | 2.2 | 1.86 | 0.88 | 1.82 | 1.01 | 2.26 | 2.14 | 1.96 | 2.96 | 9.98 | 10.66 | 1.36 |
| MgO | 0.49 | 0.38 | 0.41 | 1.62 | 0.44 | 0.16 | 0.13 | 0.38 | 0.51 | 0.25 | 0.36 | 0.38 | 0.26 | 0.62 | 0.56 | 0.74 | 0.94 | 7.01 | 6.16 | 0.46 |
| K2O | 3.68 | 3.75 | 2.84 | 3.77 | 3.95 | 2.77 | 7.48 | 3.52 | 3.24 | 1.94 | 8.21 | 3.02 | 8.98 | 2.38 | 2.46 | 2.59 | 3.5 | 0.73 | 2.27 | 4.13 |
| Na2O | 4.66 | 4.4 | 4.74 | 3.96 | 4.87 | 3.11 | 2.58 | 4.35 | 5 | 2.6 | 2.76 | 4.65 | 2.11 | 4.75 | 4.91 | 4.78 | 6.71 | 2.18 | 1.77 | 3.48 |
| TiO2 | 0.21 | 0.24 | 0.27 | 0.35 | 0.21 | 0.08 | 0.04 | 0.2 | 0.23 | 0.08 | 0.29 | 0.19 | 0.13 | 0.25 | 0.21 | 0.25 | 0.35 | 1.35 | 1.49 | 0.25 |
| P2O5 | 0.06 | 0.07 | 0.06 | 0.1 | 0.05 | 0 | 0 | 0.07 | 0.06 | 0.01 | 0.05 | 0.06 | 0.01 | 0.07 | 0.06 | 0.07 | 0.11 | 0.12 | 0.22 | 0.05 |
| MnO | 0.04 | 0.04 | 0.03 | 0.04 | 0.01 | 0.02 | 0.02 | 0.03 | 0.03 | 0.07 | 0.04 | 0.03 | 0.02 | 0.04 | 0.04 | 0.04 | 0.05 | 0.2 | 0.18 | 0.1 |
| LOI | 0.64 | 1.58 | 1.38 | 0.59 | 0.86 | 0.76 | 0.51 | 0.73 | 0.36 | 2 | 1.14 | 0.62 | 0.88 | 0.41 | 0.54 | 0.96 | 1.15 | 1.22 | 2.21 | 1.22 |
| Σ | 99.87 | 99.86 | 99.90 | 99.60 | 99.73 | 99.96 | 99.98 | 99.89 | 99.83 | 99.93 | 99.87 | 99.92 | 99.93 | 99.83 | 99.85 | 99.85 | 99.79 | 100.64 | 99.89 | 99.65 |
| K2O/Na2O | 0.52 | 0.4 | 0.56 | 0.63 | 0.53 | 0.59 | 1.91 | 0.53 | 0.43 | 0.49 | 1.96 | 0.43 | 2.81 | 0.33 | 0.33 | 0.36 | 0.34 | 0.22 | 0.85 | 0.78 |
| (K2O+Na2O)/ Al2O3 | 0.77 | 0.72 | 0.74 | 0.7 | 0.82 | 0.8 | 0.91 | 0.78 | 0.74 | 0.78 | 0.9 | 0.75 | 0.94 | 0.7 | 0.71 | 0.72 | 0.7 | 0.33 | 0.28 | 0.71 |
| A/CNK | 1.01 | 1 | 1.01 | 0.93 | 1.06 | 1.01 | 1.03 | 1.02 | 1.01 | 0.84 | 0.99 | 1.03 | 0.94 | 1.03 | 1.04 | 1.05 | 1.05 | 0.59 | 0.77 | 1.13 |
| A/NK | 1.30 | 1.39 | 1.35 | 1.43 | 1.22 | 1.24 | 1.09 | 1.29 | 1.35 | 1.28 | 1.11 | 1.34 | 1.07 | 1.44 | 1.41 | 1.39 | 1.43 | 3.04 | 3.57 | 1.40 |
| Mg# | 40 | 37 | 39 | 64 | 57 | 48 | 54 | 39 | 41 | 40 | 30 | 46 | 43 | 44 | 45 | 49 | 46 |  |  |  |
| 备注 | 灰池子岩体 | 花岗伟晶岩 | 秦岭岩群 |

注：前人数据QL0715-2（111°02'41″，33°38'50″）黑云斜长角闪岩，来自时毓等，2009；QL1515-4片麻状变辉长岩、QL1516糜棱岩化花岗岩来自黄倩雯等，2019。以下表4、表5与之相同。表中Mg#=100×Mg2+/(Mg2++Fe2+);A/CNK = (Al2O3)/(CaO+Na2O+K2O);δEu =2×Eu*N*/(Sm*N*+Gd*N*)。

附表2柳树湾铀矿岩石岩石微量元素特征表（×10-6）

Table 2 Trace(×10-6) element data of Liushuwan uranium deposit

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样号 | ZK3701-61 | ZK3701-102 | ZK3701-133 | 2017HCZ-Sc-1 | 2017HCZ-Sm-1 | ZK0501-45 | ZK0501-49 | ZK0501-104 | ZK1001-153 | ZK0001-64 | ZK1601-199 | ZK1601-215 | ZK5401-38 | ZK5401-40 | ZK5401-49 | ZK5401-57 | ZK5401-65 | QL0715-2 | QL1515-4 | QL1516 |
| Pb | 38.1 | 34.8 | 33.5 | 46 | 60.6 | 41.5 | 59 | 37.9 | 33.6 | 234 | 153 | 43.3 | 60.3 | 27.9 | 28.5 | 24.1 | 25.2 | 5.8 | 28.79 | 113 |
| Zn | 35.1 | 30.3 | 34.6 | 41.5 | 21.6 | 11.7 | 5.03 | 40.9 | 36.8 | 70.4 | 682 | 63.2 | 15.3 | 34 | 29.4 | 37 | 36.7 | 86.7 | 61.43 | 44.53 |
| Cr | 4.39 | 4.56 | 6.73 | 58.9 | 13.2 | 3.45 | 2.16 | 6.39 | 6.1 | 6.73 | 3.22 | 4.46 | 3.07 | 6.63 | 8.99 | 6.45 | 8.57 | 122.4 | 40.77 | 9.57 |
| Ni | 2.73 | 2.82 | 3.78 | 20.4 | 4.88 | 2.35 | 1.64 | 2.85 | 3.54 | 3.68 | 3.76 | 2.58 | 2.32 | 3.54 | 3.67 | 3.46 | 4.34 | 88.49 | 48.11 | 5.07 |
| Co | 2.9 | 3 | 3.42 | 8.4 | 2.32 | 1.55 | 1.06 | 2.66 | 3.42 | 1.97 | 4.2 | 2.3 | 2.03 | 3.38 | 3.4 | 3.54 | 4.75 | 44.71 | 32.69 | 3.54 |
| Li | 47.3 | 54.2 | 45.7 | 51.2 | 49.4 | 4.01 | 4.32 | 29.1 | 42 | 48.4 | 24.5 | 52.5 | 12 | 30.2 | 41 | 42.9 | 49.5 | 22.8 | 14.21 | 33.55 |
| Rb | 130 | 128 | 107 | 164 | 178 | 98.3 | 270 | 118 | 102 | 84.3 | 305 | 126 | 248 | 88.2 | 94 | 93.9 | 118 | 44.03 | 75.87 | 196 |
| Cs | 6.59 | 9.74 | 6.64 | 11.4 | 8.88 | 3.84 | 10.9 | 6.43 | 4.64 | 4.15 | 7.08 | 8.02 | 4.8 | 4.73 | 6.44 | 6.82 | 10.2 | 4.94 | 6.14 | 15.09 |
| Mo | 1.44 | 1.62 | 1.36 | 0.27 | 0.24 | 0.51 | 0.72 | 0.86 | 1.46 | 2.34 | 1.45 | 0.8 | 1.51 | 1.74 | 1.48 | 1.5 | 1.28 | 2.32 | 0.16 | 0.31 |
| Sr | 508 | 500 | 478 | 602 | 425 | 142 | 286 | 418 | 570 | 140 | 226 | 294 | 426 | 444 | 460 | 466 | 601 | 157 | 934 | 219 |
| Ba | 1090 | 1140 | 853 | 1090 | 730 | 254 | 1110 | 822 | 1050 | 199 | 858 | 375 | 2990 | 643 | 584 | 780 | 864 | 125.41 | 1404 | 684 |
| V | 21.3 | 20.2 | 22.7 | 45.3 | 13.8 | 5.56 | 2.5 | 17.5 | 22.8 | 7.42 | 13.4 | 11.9 | 20.8 | 27 | 20.6 | 26.2 | 42 | 422 | 350.54 | 14.57 |
| Sc | 7.65 | 7.36 | 7.47 | 9.23 | 6.78 | 4.71 | 6.88 | 6.95 | 7.03 | 4.52 | 11.4 | 6.78 | 8.26 | 7.5 | 7.01 | 7.16 | 9.29 | 43.29 | 15.76 | 5.37 |
| Nb | 7.11 | 6.48 | 6.99 | 8.74 | 8.36 | 3.96 | 1.4 | 5.73 | 6 | 6.15 | 21.4 | 6.41 | 5.07 | 9.65 | 6.97 | 5.5 | 9.19 | 9.49 | 7.95 | 13.52 |
| Ta | 0.55 | 0.42 | 0.64 | 0.82 | 0.98 | 0.79 | 0.47 | 0.48 | 0.7 | 1.39 | 3.64 | 0.53 | 0.54 | 0.7 | 0.64 | 0.67 | 0.53 | 0.87 | 0.3 | 1.09 |
| Zr | 91.4 | 91.8 | 108 | 116 | 92.5 | 140 | 3.5 | 61.8 | 114 | 120 | 32.2 | 87.8 | 12.5 | 82.4 | 89.7 | 93.2 | 140 | 125.77 | 87.5 | 148.75 |
| Hf | 2.78 | 2.56 | 3.17 | 3.54 | 3.08 | 4.92 | 0.17 | 1.96 | 3.42 | 5.04 | 1.46 | 2.93 | 0.47 | 2.51 | 2.67 | 2.85 | 4.41 | 3.26 | 2.32 | 5.05 |
| Be | 2.22 | 1.79 | 2.34 | 3.11 | 4.6 | 1.74 | 0.81 | 2.08 | 2.21 | 1.02 | 1.2 | 2.03 | 0.46 | 1.82 | 2.13 | 2.05 | 3.29 | 0.61 | 1.07 | 5.38 |
| Ga | 17.6 | 16.4 | 18.1 | 18.8 | 19.6 | 10.3 | 10.4 | 17 | 19.3 | 9.58 | 17.8 | 17.2 | 13.7 | 16.8 | 16.7 | 17 | 27.1 | 18.11 | 19.84 | 19.86 |
| U | 3.59 | 1.64 | 6.37 | 3.99 | 5 | 620 | 3.75 | 2.24 | 4.42 | 201 | 678 | 5.5 | 1180 | 13.6 | 3.82 | 4.3 | 3.12 | 2.87 | 0.48 | 8.93 |
| Th | 10.5 | 8.94 | 12.9 | 13.1 | 11 | 99.1 | 0.75 | 7.12 | 15.2 | 254 | 110 | 11.9 | 158 | 14.5 | 7.35 | 9.24 | 10.5 | 0.84 | 2.77 | 20.03 |
| 备注 | 灰池子岩体 | 花岗伟晶岩 | 秦岭岩群 |

附表3 柳树湾铀矿岩石岩石稀土元素特征表（×10-6）

Table 3 REE (×10-6) element data of Liushuwan uranium deposit

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样号 | ZK3701-61 | ZK3701-102 | ZKL3701-133 | 2017HCZ-Sc-1 | 2017HCZ-Sm-1 | ZK0501-45 | ZK0501-49 | ZK0501-104 | ZK1001-153 | ZK0001-64 | ZK1601-199 | ZK1601-215 | ZK5401-38 | ZK5401-40 | ZK5401-49 | ZK5401-57 | ZK5401-65 | QL0715-2 | QL1515-4 | QL1516 |
| La | 24.3 | 26.4 | 29.9 | 24.1 | 13.4 | 1.13 | 0.36 | 13.4 | 25.1 | 5.88 | 53.8 | 18.3 | 2.22 | 18.8 | 18.9 | 21 | 29.4 | 13.31 | 37.95 | 37.97 |
| Ce | 41.2 | 44.8 | 49.5 | 43 | 16.2 | 3.54 | 0.6 | 23.3 | 35.3 | 10.1 | 109 | 31.6 | 7.21 | 32.4 | 31 | 36.7 | 47.8 | 31 | 76.08 | 75.31 |
| Pr | 4.32 | 4.72 | 5.11 | 4.85 | 2.67 | 0.47 | 0.04 | 2.47 | 4.38 | 1.03 | 13.2 | 3.43 | 1.26 | 3.36 | 3.42 | 3.74 | 5.61 | 3.77 | 10.68 | 9.51 |
| Nd | 14.8 | 16 | 17.3 | 17.1 | 9.27 | 2.9 | 0.14 | 8.59 | 14.6 | 4.04 | 49.2 | 11.9 | 7.89 | 11.5 | 11.8 | 12.9 | 19.8 | 15.56 | 39.32 | 33.16 |
| Sm | 2.23 | 2.36 | 2.46 | 2.99 | 1.58 | 1.5 | 0.05 | 1.41 | 2.18 | 1.27 | 11.8 | 2.1 | 3.86 | 1.9 | 1.93 | 2.05 | 3.28 | 3.62 | 6.13 | 5.7 |
| Eu | 0.94 | 0.94 | 0.84 | 0.92 | 0.52 | 0.37 | 0.57 | 0.66 | 0.9 | 0.68 | 0.97 | 0.52 | 2.05 | 0.78 | 0.7 | 0.74 | 0.98 | 1.2 | 2.06 | 1.06 |
| Gd | 1.93 | 2.01 | 2.01 | 2.68 | 1.2 | 1.72 | 0.07 | 1.26 | 1.88 | 1.85 | 9.95 | 1.82 | 4.5 | 1.7 | 1.61 | 1.73 | 2.77 | 4.45 | 4.78 | 4.51 |
| Tb | 0.22 | 0.23 | 0.23 | 0.32 | 0.12 | 0.38 | 0.01 | 0.16 | 0.24 | 0.39 | 1.76 | 0.25 | 0.9 | 0.21 | 0.2 | 0.21 | 0.34 | 0.67 | 0.6 | 0.63 |
| Dy | 1.02 | 0.94 | 1.03 | 1.49 | 0.45 | 2.81 | 0.06 | 0.78 | 1.18 | 2.87 | 9.77 | 1.4 | 6 | 1.06 | 0.91 | 1.01 | 1.58 | 4.86 | 2.73 | 3.21 |
| Ho | 0.18 | 0.16 | 0.19 | 0.27 | 0.08 | 0.65 | 0.01 | 0.14 | 0.22 | 0.67 | 1.8 | 0.26 | 1.17 | 0.19 | 0.17 | 0.19 | 0.27 | 1.08 | 0.49 | 0.61 |
| Er | 0.51 | 0.44 | 0.51 | 0.69 | 0.2 | 1.95 | 0.04 | 0.37 | 0.6 | 2.1 | 4.17 | 0.67 | 2.77 | 0.5 | 0.46 | 0.52 | 0.68 | 3.11 | 1.3 | 1.66 |
| Tm | 0.09 | 0.06 | 0.08 | 0.1 | 0.03 | 0.31 | 0.01 | 0.06 | 0.09 | 0.35 | 0.66 | 0.1 | 0.43 | 0.08 | 0.07 | 0.08 | 0.1 | 0.44 | 0.2 | 0.3 |
| Yb | 0.59 | 0.4 | 0.56 | 0.72 | 0.2 | 2.12 | 0.08 | 0.4 | 0.62 | 2.49 | 3.93 | 0.65 | 2.45 | 0.49 | 0.47 | 0.56 | 0.69 | 2.78 | 1.2 | 1.86 |
| Lu | 0.09 | 0.06 | 0.09 | 0.1 | 0.03 | 0.3 | 0.02 | 0.07 | 0.09 | 0.41 | 0.48 | 0.1 | 0.28 | 0.07 | 0.07 | 0.09 | 0.11 | 0.62 | 0.17 | 0.26 |
| Y | 5.7 | 4.57 | 5.6 | 7.88 | 2.36 | 13.9 | 0.64 | 4.33 | 6.24 | 19.2 | 38.1 | 7.63 | 24.6 | 5.32 | 4.94 | 5.61 | 7.68 | 26.84 | 17 | 16.35 |
| ΣREE | 98.11 | 115.40 | 104.10 | 107.21 | 48.31 | 34.05 | 2.69 | 57.39 | 93.63 | 53.33 | 308.59 | 80.73 | 67.59 | 78.36 | 76.65 | 87.13 | 121.09 | 113.31 | 200.69 | 192.10 |
| LREE/HREE | 8.51 | 10.21 | 10.73 | 6.52 | 9.35 | 0.41 | 1.90 | 6.59 | 7.38 | 0.76 | 3.37 | 5.27 | 0.57 | 7.15 | 7.61 | 7.71 | 7.52 | 1.53 | 6.05 | 5.54 |
| LaN/YbN | 27.20 | 35.26 | 43.58 | 22.10 | 44.24 | 0.35 | 3.01 | 22.12 | 26.73 | 1.56 | 9.04 | 18.59 | 0.60 | 25.33 | 26.55 | 24.76 | 28.14 | 3.16 | 20.88 | 13.48 |
| δEu | 1.37 | 1.13 | 1.30 | 0.98 | 1.12 | 0.71 | 30.04 | 1.50 | 1.34 | 1.37 | 0.27 | 0.80 | 1.52 | 1.31 | 1.19 | 1.18 | 0.98 | 0.92 | 1.13 | 0.62 |
| 备注 | 灰池子岩体 | 花岗伟晶岩 | 秦岭岩群 |

附表4 灰池子岩体LA-ICP-MS锆石 U-Pb测年结果表

Table 4 LA-ICP-MS U-Pb isotopic data of zircons from the Huichizi pluton

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 301γ | （10-6） | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ | 208Pb/232Th | 1σ | 232Th/238U | 1σ | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ |
| 测点 | Pb | U |
| SAM.01 | 159 | 2478 | 0.0647 | 0.001 | 0.6786 | 0.0130 | 0.0760 | 0.0011 | 0.0049 | 0.0003 | 0.925 | 0.033 | 404 | 6 | 526 | 10 | 1095 | 29 |
| SAM.02 | 46 | 612 | 0.0710 | 0.0018 | 0.9722 | 0.0167 | 0.0993 | 0.0025 | 0.0701 | 0.0026 | 0.118 | 0.004 | 442 | 11 | 690 | 12 | 1611 | 47 |
| SAM.03 | 115 | 975 | 0.1192 | 0.0014 | 1.1871 | 0.0191 | 0.0722 | 0.0010 | 0.0579 | 0.0014 | 0.143 | 0.001 | 726 | 9 | 795 | 13 | 992 | 29 |
| SAM.04 | 168 | 2465 | 0.0679 | 0.0009 | 0.7713 | 0.0122 | 0.0824 | 0.0012 | 0.0822 | 0.002 | 0.064 | 0.000 | 423 | 5 | 581 | 9 | 1256 | 29 |
| SAM.05 | 149 | 1929 | 0.0716 | 0.001 | 0.8210 | 0.0172 | 0.0831 | 0.0013 | 0.0353 | 0.001 | 0.321 | 0.001 | 446 | 6 | 609 | 13 | 1272 | 31 |
| SAM.06 | 67 | 515 | 0.1272 | 0.0018 | 1.5929 | 0.0297 | 0.0908 | 0.0013 | 0.0341 | 0.0008 | 0.365 | 0.002 | 772 | 11 | 967 | 18 | 1443 | 28 |
| SAM.07 | 111 | 1572 | 0.0681 | 0.0008 | 0.7560 | 0.0145 | 0.0805 | 0.0013 | 0.0363 | 0.0011 | 0.221 | 0.001 | 425 | 5 | 572 | 11 | 1208 | 33 |
| SAM.08 | 51 | 530 | 0.0980 | 0.0014 | 0.9659 | 0.0171 | 0.0715 | 0.0011 | 0.0409 | 0.0012 | 0.134 | 0.001 | 603 | 8 | 686 | 12 | 971 | 31 |
| SAM.09 | 243 | 1992 | 0.1246 | 0.0016 | 1.3069 | 0.0216 | 0.0760 | 0.0011 | 0.0322 | 0.001 | 0.216 | 0.000 | 757 | 10 | 849 | 14 | 1096 | 29 |
| SAM.10 | 107 | 1636 | 0.0630 | 0.0008 | 0.8530 | 0.0153 | 0.0982 | 0.0018 | 0.0500 | 0.0013 | 0.132 | 0.002 | 394 | 5 | 626 | 11 | 1591 | 34 |
| SAM.11 | 142 | 2020 | 0.0734 | 0.0009 | 0.7130 | 0.0148 | 0.0704 | 0.0012 | 0.1356 | 0.0071 | 0.020 | 0.000 | 457 | 6 | 547 | 11 | 941 | 35 |
| SAM.12 | 114 | 1052 | 0.1111 | 0.0014 | 1.0219 | 0.0165 | 0.0667 | 0.0009 | 0.0316 | 0.0007 | 0.190 | 0.007 | 679 | 8 | 715 | 12 | 828 | 29 |
| SAM.13 | 79 | 1165 | 0.0658 | 0.0013 | 0.7820 | 0.0189 | 0.0861 | 0.0013 | 0.0833 | 0.002 | 0.076 | 0.002 | 411 | 8 | 587 | 14 | 1342 | 29 |
| SAM.14 | 162 | 3187 | 0.0467 | 0.0006 | 0.7156 | 0.0117 | 0.1111 | 0.0017 | 0.0831 | 0.0021 | 0.081 | 0.001 | 294 | 3 | 548 | 9 | 1817 | 27 |
| SAM.15 | 136 | 1347 | 0.1049 | 0.0013 | 0.9842 | 0.0160 | 0.0681 | 0.0010 | 0.0680 | 0.0019 | 0.069 | 0.000 | 643 | 8 | 696 | 11 | 871 | 30 |
| SAM.16 | 66 | 357 | 0.1769 | 0.0022 | 1.8864 | 0.0312 | 0.0773 | 0.0011 | 0.0568 | 0.0017 | 0.389 | 0.002 | 1050 | 13 | 1076 | 18 | 1130 | 29 |
| SAM.17 | 136 | 962 | 0.1455 | 0.0017 | 1.5757 | 0.0250 | 0.0785 | 0.0011 | 0.1206 | 0.0038 | 0.051 | 0.000 | 876 | 10 | 961 | 15 | 1161 | 29 |
| SAM.18 | 75 | 515 | 0.1497 | 0.0019 | 1.5831 | 0.0275 | 0.0767 | 0.0011 | 0.0590 | 0.0016 | 0.111 | 0.001 | 899 | 12 | 964 | 17 | 1113 | 29 |
| SAM.19 | 54 | 298 | 0.1783 | 0.0026 | 1.9432 | 0.0360 | 0.0790 | 0.0011 | 0.0610 | 0.0015 | 0.250 | 0.004 | 1058 | 15 | 1096 | 20 | 1173 | 29 |
| SAM.20 | 165 | 790 | 0.2000 | 0.0024 | 2.3393 | 0.0376 | 0.0848 | 0.0012 | 0.0571 | 0.0013 | 0.431 | 0.003 | 1175 | 14 | 1224 | 20 | 1312 | 27 |
| SAM.21 | 53 | 371 | 0.1396 | 0.0018 | 1.6637 | 0.0297 | 0.0864 | 0.0013 | 0.0423 | 0.0009 | 0.279 | 0.002 | 842 | 11 | 995 | 18 | 1348 | 28 |
| SAM.22 | 145 | 2165 | 0.0699 | 0.0009 | 0.6843 | 0.0125 | 0.0710 | 0.0014 | 0.1296 | 0.0047 | 0.020 | 0.000 | 436 | 5 | 529 | 10 | 958 | 40 |
| SAM.23 | 204 | 964 | 0.1567 | 0.0019 | 1.9181 | 0.0310 | 0.0888 | 0.0013 | 0.0606 | 0.0015 | 1.198 | 0.004 | 939 | 11 | 1087 | 18 | 1399 | 27 |
| SAM.24 | 8 | 24 | 0.1359 | 0.0017 | 10.5737 | 0.1829 | 0.5642 | 0.0091 | 0.5721 | 0.0155 | 0.296 | 0.001 | 822 | 11 | 2486 | 43 | 4418 | 24 |
| SAM.25 | 116 | 1720 | 0.0689 | 0.0014 | 0.7180 | 0.0142 | 0.0756 | 0.0012 | 0.0533 | 0.0016 | 0.065 | 0.001 | 430 | 8 | 549 | 11 | 1084 | 31 |
| SAM.26 | 58 | 523 | 0.1167 | 0.0019 | 1.1033 | 0.0236 | 0.0685 | 0.0010 | 0.0436 | 0.0011 | 0.091 | 0.004 | 712 | 11 | 755 | 16 | 885 | 31 |
| SAM.27 | 99 | 603 | 0.1601 | 0.0021 | 1.6290 | 0.0282 | 0.0738 | 0.0011 | 0.0495 | 0.0012 | 0.365 | 0.006 | 958 | 13 | 981 | 17 | 1035 | 29 |
| SAM.28 | 59 | 424 | 0.1469 | 0.0017 | 1.3891 | 0.0227 | 0.0686 | 0.0010 | 0.0454 | 0.0011 | 0.080 | 0.001 | 884 | 10 | 884 | 14 | 886 | 30 |
| SAM.29 | 131 | 797 | 0.1727 | 0.0026 | 2.0563 | 0.0421 | 0.0863 | 0.0013 | 0.0438 | 0.0011 | 0.038 | 0.001 | 1027 | 16 | 1154 | 23 | 1346 | 28 |
| SAM.30 | 139 | 1096 | 0.1332 | 0.0020 | 1.2373 | 0.0237 | 0.0674 | 0.0010 | 0.0387 | 0.0009 | 0.098 | 0.002 | 806 | 12 | 818 | 16 | 849 | 30 |
| SAM.31 | 69 | 240 | 0.2805 | 0.0034 | 3.7709 | 0.0606 | 0.0975 | 0.0014 | 0.0761 | 0.0016 | 0.296 | 0.001 | 1594 | 19 | 1587 | 26 | 1577 | 26 |
| SAM.32 | 243 | 3955 | 0.0632 | 0.0008 | 0.6108 | 0.0098 | 0.0701 | 0.0010 | 0.0245 | 0.0006 | 0.130 | 0.001 | 395 | 5 | 484 | 8 | 932 | 29 |
| SAM.33 | 93 | 1598 | 0.0613 | 0.0007 | 0.5031 | 0.0082 | 0.0596 | 0.0009 | 0.0201 | 0.0005 | 0.099 | 0.001 | 383 | 5 | 414 | 7 | 587 | 31 |
| SAM.34 | 78 | 480 | 0.1688 | 0.0022 | 1.8029 | 0.0338 | 0.0775 | 0.0012 | 0.0452 | 0.0012 | 0.125 | 0.002 | 1005 | 13 | 1047 | 20 | 1134 | 30 |
| SAM.35 | 8 | 338 | 0.0215 | 0.0003 | 0.1380 | 0.0051 | 0.0465 | 0.0017 | 0.0064 | 0.0002 | 0.498 | 0.002 | 137 | 2 | 131 | 5 | 26 | 87 |

附表5 301伟晶岩脉LA-ICPMS锆石 U-Pb测年结果表

Table 5 LA-ICP-MS U-Pb isotopic data of zircons from 301 pegmatite

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ρ301 | 单位（10-6） | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ | 208Pb/232Th | 1σ | 232Th/238U | 1σ | 206Pb/238U | 1σ | 207Pb/235U | 1σ | 207Pb/206Pb | 1σ |
| 测点 | Pb | U |
| SAM.01 | 206 | 3319 | 0.0666 | 0.0009 | 0.5115 | 0.0093 | 0.0557 | 0.0008 | 0.0276 | 0.0011 | 0.046 | 0.000 | 416 | 5 | 419 | 8 | 441 | 33 |
| SAM.02 | 233 | 3799 | 0.0657 | 0.0008 | 0.5213 | 0.0083 | 0.0576 | 0.0008 | 0.0183 | 0.0006 | 0.075 | 0.001 | 410 | 5 | 426 | 7 | 514 | 32 |
| SAM.03 | 264 | 5230 | 0.0534 | 0.0006 | 0.4406 | 0.0071 | 0.0599 | 0.0009 | 0.0139 | 0.0005 | 0.121 | 0.001 | 335 | 4 | 371 | 6 | 599 | 33 |
| SAM.04 | 340 | 5416 | 0.0679 | 0.0008 | 0.5068 | 0.0079 | 0.0541 | 0.0008 | 0.0178 | 0.0005 | 0.048 | 0.000 | 424 | 5 | 416 | 7 | 375 | 33 |
| SAM.05 | 343 | 6520 | 0.0568 | 0.0007 | 0.4205 | 0.0068 | 0.0537 | 0.0008 | 0.0152 | 0.0004 | 0.062 | 0.000 | 356 | 4 | 356 | 6 | 357 | 33 |
| SAM.06 | 646 | 6202 | 0.1019 | 0.0012 | 1.2278 | 0.0199 | 0.0874 | 0.0013 | 0.1693 | 0.0041 | 0.055 | 0.000 | 626 | 8 | 813 | 13 | 1369 | 28 |
| SAM.07 | 305 | 5085 | 0.0633 | 0.0007 | 0.5523 | 0.0088 | 0.0633 | 0.0009 | 0.0197 | 0.0005 | 0.103 | 0.001 | 396 | 5 | 447 | 7 | 717 | 31 |
| SAM.08 | 355 | 5701 | 0.0672 | 0.0008 | 0.5017 | 0.0080 | 0.0541 | 0.0008 | 0.0150 | 0.0004 | 0.065 | 0.000 | 419 | 5 | 413 | 7 | 377 | 33 |
| SAM.09 | 196 | 3093 | 0.0684 | 0.0009 | 0.5280 | 0.0090 | 0.0560 | 0.0008 | 0.0260 | 0.0007 | 0.028 | 0.000 | 427 | 6 | 430 | 7 | 450 | 33 |
| SAM.10 | 384 | 6210 | 0.0669 | 0.0008 | 0.5064 | 0.0080 | 0.0549 | 0.0008 | 0.0194 | 0.0005 | 0.040 | 0.000 | 417 | 5 | 416 | 7 | 409 | 33 |
| SAM.11 | 283 | 4492 | 0.0679 | 0.0008 | 0.5067 | 0.0081 | 0.0541 | 0.0008 | 0.0194 | 0.0005 | 0.058 | 0.000 | 423 | 5 | 416 | 7 | 376 | 33 |
| SAM.12 | 212 | 4029 | 0.0563 | 0.0007 | 0.4358 | 0.0072 | 0.0562 | 0.0008 | 0.0252 | 0.0006 | 0.053 | 0.000 | 353 | 5 | 367 | 6 | 459 | 33 |
| SAM.13 | 313 | 5067 | 0.0667 | 0.0008 | 0.5032 | 0.0080 | 0.0547 | 0.0008 | 0.0223 | 0.0006 | 0.040 | 0.000 | 416 | 5 | 414 | 7 | 400 | 33 |
| SAM.14 | 354 | 5745 | 0.0669 | 0.0008 | 0.4966 | 0.0079 | 0.0538 | 0.0008 | 0.0187 | 0.0005 | 0.038 | 0.000 | 418 | 5 | 409 | 7 | 363 | 33 |
| SAM.15 | 272 | 4465 | 0.0659 | 0.0008 | 0.4941 | 0.0079 | 0.0544 | 0.0008 | 0.0214 | 0.0006 | 0.046 | 0.000 | 411 | 5 | 408 | 7 | 388 | 33 |
| SAM.16 | 356 | 4456 | 0.0846 | 0.0012 | 0.6961 | 0.0136 | 0.0597 | 0.0009 | 0.0440 | 0.0018 | 0.057 | 0.001 | 524 | 7 | 536 | 11 | 591 | 33 |
| SAM.17 | 359 | 5819 | 0.0667 | 0.0008 | 0.4934 | 0.0079 | 0.0536 | 0.0008 | 0.0201 | 0.0007 | 0.044 | 0.000 | 416 | 5 | 407 | 7 | 356 | 33 |
| SAM.18 | 311 | 4743 | 0.0679 | 0.0008 | 0.5093 | 0.0081 | 0.0544 | 0.0008 | 0.0225 | 0.0007 | 0.047 | 0.000 | 424 | 5 | 418 | 7 | 386 | 33 |
| SAM.19 | 131 | 4918 | 0.0287 | 0.0003 | 0.2163 | 0.0034 | 0.0547 | 0.0008 | 0.0093 | 0.0003 | 0.065 | 0.000 | 182 | 2 | 199 | 3 | 401 | 33 |
| SAM.20 | 163 | 5313 | 0.0313 | 0.0006 | 0.3066 | 0.0054 | 0.0710 | 0.0011 | 0.0528 | 0.0014 | 0.035 | 0.000 | 199 | 3 | 272 | 5 | 956 | 32 |
| SAM.21 | 338 | 5491 | 0.0663 | 0.0008 | 0.4992 | 0.0079 | 0.0546 | 0.0008 | 0.0215 | 0.0006 | 0.050 | 0.000 | 414 | 5 | 411 | 7 | 394 | 33 |
| SAM.22 | 198 | 3226 | 0.0658 | 0.0008 | 0.5237 | 0.0084 | 0.0577 | 0.0009 | 0.0430 | 0.0014 | 0.031 | 0.000 | 411 | 5 | 428 | 7 | 518 | 33 |
| SAM.23 | 249 | 3249 | 0.0816 | 0.0011 | 0.6604 | 0.0115 | 0.0587 | 0.0009 | 0.0480 | 0.0015 | 0.042 | 0.000 | 505 | 7 | 515 | 9 | 557 | 32 |
| SAM.24 | 376 | 6093 | 0.0663 | 0.0010 | 0.5006 | 0.0094 | 0.0547 | 0.0008 | 0.0395 | 0.0021 | 0.034 | 0.001 | 414 | 6 | 412 | 8 | 401 | 33 |
| SAM.25 | 9 | 389 | 0.0216 | 0.0003 | 0.1440 | 0.0053 | 0.1485 | 0.0017 | 0.0079 | 0.0003 | 0.076 | 0.002 | 137 | 2 | 137 | 5 | 122 | 82 |
| SAM.26 | 229 | 3626 | 0.0682 | 0.0008 | 0.5122 | 0.0084 | 0.0545 | 0.0008 | 0.0183 | 0.0006 | 0.049 | 0.001 | 425 | 5 | 420 | 7 | 391 | 33 |
| SAM.27 | 241 | 3793 | 0.0666 | 0.0011 | 0.5045 | 0.0099 | 0.0549 | 0.0008 | 0.0413 | 0.0018 | 0.072 | 0.001 | 416 | 7 | 415 | 8 | 408 | 33 |
| SAM.28 | 216 | 3528 | 0.0665 | 0.001 | 0.4985 | 0.0088 | 0.0544 | 0.0008 | 0.0214 | 0.0006 | 0.032 | 0.000 | 415 | 6 | 411 | 7 | 387 | 33 |
| SAM.29 | 278 | 4468 | 0.0675 | 0.0008 | 0.4996 | 0.0081 | 0.0537 | 0.0008 | 0.0215 | 0.0007 | 0.038 | 0.000 | 421 | 5 | 411 | 7 | 358 | 33 |
| SAM.30 | 231 | 3765 | 0.0654 | 0.0009 | 0.5257 | 0.0092 | 0.0583 | 0.0009 | 0.0387 | 0.0014 | 0.038 | 0.000 | 409 | 6 | 429 | 7 | 540 | 33 |

附表6 白云母（15GJ-01）Ar-Ar测年结果表

Table 6 Ar-Ar isotopic data of muscovite（15GJ-01）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 序号 | T（℃） | 累积39Ar% | 年龄（Ma） | 误差(1σ)（±Ma） | Ca/K |
| 1 | 680 | 0.65 | 285.5 | 2.9 | 0.34 |
| 2 | 730 | 1.36 | 332.6 | 3.3 | 0.3549 |
| 3 | 760 | 2.44 | 334.3 | 3.2 | 0 |
| 4 | 790 | 4.11 | 338.2 | 3.2 | 0.5284 |
| 5 | 820 | 5.66 | 340.1 | 3.1 | 0 |
| 6 | 850 | 7.72 | 331.9 | 3.1 | 0.8727 |
| 7 | 890 | 19.48 | 336.7 | 3.1 | 0.0731 |
| 8 | 920 | 36.66 | 334.6 | 3.1 | 0 |
| 9 | 960 | 54.47 | 334.3 | 3.1 | 0 |
| 10 | 1000 | 68.50 | 334.5 | 3.1 | 0 |
| 11 | 1040 | 75.18 | 333.6 | 3.1 | 0.2811 |
| 12 | 1100 | 82.85 | 335.1 | 3.1 | 0.0066 |
| 13 | 1200 | 98.47 | 335.2 | 3.1 | 0.1985 |
| 14 | 1300 | 99.75 | 334.6 | 3.5 | 0.488 |
| 15 | 1400 | 100.00 | 330.4 | 7.9 | 1.943 |

注：测试单位为国家地质实验测试中心Ar-Ar同位素实验室

附表7 花岗伟晶岩105号脉辉钼矿Re-Os测年结果表

Table 7 Re-Os isotopic data of molybdenite from 105 pegmatite

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 样号 | 样品名称 | 样品重量（g） | 岩性 | Re ng/g | 普Os ng/g | 187Re ng/g | 187Os ng/g | 模式年龄（Ma） |
| 测定值 | 不确定度 | 测定值 | 不确定度 | 测定值 | 不确定度 | 测定值 | 不确定度 | 测定值 | 不确定度 |
| 105-1 | 辉钼矿 | 0.00527 | 花岗伟晶岩 | 66828 | 457 | 0.0066 | 0.3605 | 42003 | 287 | 306.7 | 1.9 | 436.7 | 5.9 |
| 105-2 | 辉钼矿 | 0.00507 | 花岗伟晶岩 | 67259 | 620 | 0.0067 | 0.2944 | 42274 | 390 | 303.5 | 2.1 | 429.4 | 6.5 |
| 105-2 | 辉钼矿 | 0.02052 | 花岗伟晶岩 | 63367 | 643 | 0.1735 | 0.3592 | 39827 | 404 | 287.2 | 2.2 | 431.3 | 6.9 |
| 105-3 | 辉钼矿 | 0.02061 | 花岗伟晶岩 | 66351 | 608 | 0.0008 | 0.0443 | 41703 | 382 | 302.1 | 1.9 | 433.2 | 6.4 |
| 105-3 | 辉钼矿 | 0.00526 | 花岗伟晶岩 | 67669 | 524 | 0.0064 | 0.2136 | 42531 | 329 | 309.4 | 1.9 | 435.1 | 6.0 |
| 105-4 | 辉钼矿 | 0.00506 | 花岗伟晶岩 | 68720 | 687 | 0.0067 | 0.2928 | 43192 | 432 | 311.3 | 2 | 431.1 | 6.7 |
| 105-5 | 辉钼矿 | 0.00501 | 花岗伟晶岩 | 56917 | 485 | 0.0067 | 0.4376 | 35773 | 305 | 253.3 | 1.7 | 423.5 | 6.2 |

注：测试单位为国家地质实验测试中心Re-Os同位素实验室