附表1 主量元素（%）、稀土元素（10-6）、微量元素（10-6）与Sr-Nd同位素分析结果

Appendix Table 1 Major elements(%), trace elements(10-6), and Sr-Nd isotopic compositions of ultramafic rocks from Yunkai

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 样品号 | 17SJ01-1 | 17SJ01-2 | 17SJ01-3 | 17SJ01-4 | 17SJ01-5 | 17SJ01-6 |
| 采样地 | 阳春三甲双井 |
| 岩性 | 角闪石岩 | 辉石岩 |
| SiO2 | 35.92 | 42.68 | 38.77 | 34.14 | 39.24 | 49.44 |
| TiO2 | 3.72 | 1.48 | 3.33 | 2.74 | 1.24 | 0.75 |
| Al2O3 | 8.26 | 6.71 | 10.16 | 8.47 | 3.46 | 4.55 |
| Fe2O3 | 10.02 | 11.65 | 8.19 | 10.35 | 8.68 | 1.25 |
| FeO | 13.33 | 12.55 | 12.72 | 14.71 | 10.92 | 6.98 |
| MnO | 0.35 | 0.21 | 0.35 | 0.32 | 0.27 | 0.15 |
| MgO | 8.71 | 6.40 | 7.65 | 8.54 | 9.82 | 15.52 |
| CaO | 12.44 | 11.76 | 11.71 | 11.79 | 20.06 | 16.66 |
| Na2O | 1.14 | 1.03 | 1.36 | 1.03 | 0.49 | 0.46 |
| K2O | 1.02 | 0.86 | 1.77 | 1.89 | 0.06 | 1.72 |
| P2O5 | 1.94 | 2.01 | 0.68 | 2.33 | 3.07 | 0.12 |
| S | 1.28 | 0.34 | 1.15 | 1.84 | 0.77 | 0.01 |
| LOST | 1.40 | 1.05 | 1.59 | 1.79 | 1.22 | 1.26 |
| Total | 99.53 | 98.73 | 99.42 | 99.94 | 99.31 | 98.86 |
| FeOT | 22.35 | 23.03 | 20.09 | 24.02 | 18.73 | 8.10 |
| Fe2O3T | 24.83 | 25.60 | 22.33 | 26.70 | 20.81 | 9.01 |
| Mg# | 54 | 48 | 52 | 51 | 62 | 80 |
| La | 44.8 | 63.2 | 35.3 | 56.2 | 29 | 4.72 |
| Ce | 150 | 185 | 128 | 167 | 93.7 | 15.3 |
| Pr | 21.4 | 24.8 | 19.4 | 23 | 13.6 | 2.31 |
| Nd | 108 | 118 | 101 | 112 | 70.3 | 12 |
| Sm | 27.4 | 27.6 | 25.6 | 27.3 | 17.5 | 3.3 |
| Eu | 5.73 | 4.43 | 5.8 | 5.74 | 3.96 | 0.8 |
| Gd | 21.4 | 19.1 | 19.4 | 21.7 | 13.6 | 2.61 |
| Tb | 3.12 | 2.47 | 2.84 | 3.2 | 1.86 | 0.41 |
| Dy | 16.3 | 11 | 14.8 | 16.7 | 8.92 | 2.18 |
| Ho | 2.84 | 1.75 | 2.61 | 2.93 | 1.46 | 0.39 |
| Er | 6.78 | 3.95 | 6.19 | 6.95 | 3.26 | 0.94 |
| Tm | 0.9 | 0.47 | 0.83 | 0.92 | 0.4 | 0.14 |
| Yb | 5.34 | 2.66 | 4.92 | 5.46 | 2.4 | 0.81 |
| Lu | 0.66 | 0.32 | 0.62 | 0.69 | 0.32 | 0.11 |
| Sc | 73.4 | 96.3 | 50.5 | 73.1 | 88.4 | 61.1 |
| V | 598 | 644 | 520 | 635 | 558 | 217 |
| Cr | 86.4 | 18.2 | 262 | 34 | 98.2 | 1290 |
| Co | 65.8 | 60.5 | 80.3 | 68.4 | 83.5 | 51.7 |
| Ni | 32.8 | 12.5 | 77.1 | 21.6 | 41.2 | 138 |
| Cu | 158 | 244 | 200 | 154 | 198 | 130 |
| Zn | 192 | 208 | 203 | 212 | 99.5 | 85 |
| Ga | 20.1 | 33.1 | 22.6 | 23.3 | 10.1 | 7.56 |
| Rb | 10.8 | 19.7 | 35.2 | 54.1 | 2.06 | 103 |
| Sr | 367 | 112 | 331 | 342 | 243 | 106 |
| Y | 62.9 | 37.7 | 55.8 | 65.6 | 31.6 | 8.61 |
| Zr | 56.6 | 59.9 | 87.4 | 48.4 | 23.3 | 13.1 |
| Nb | 21.2 | 9.49 | 23.5 | 15 | 3.33 | 6.01 |
| Mo | 4.3 | 0.49 | 0.73 | 0.55 | 0.34 | 0.54 |
| Sn | 14.8 | 16.6 | 18.1 | 10.2 | 10.3 | 8.01 |
| Ba | 136 | 63.2 | 302 | 393 | 10.4 | 188 |
| Hf | 2.68 | 3.17 | 3.97 | 2.53 | 1.41 | 0.56 |
| Ta | 1.07 | 1.04 | 1.41 | 1.07 | 0.64 | 0.98 |
| Pb | 8.79 | 12.5 | 14.7 | 5.21 | 5.27 | 7.3 |
| Th | 1.52 | 9.98 | 0.96 | 2.94 | 2.02 | 0.57 |
| U | 0.48 | 2.87 | 0.54 | 0.95 | 0.42 | 0.21 |
| SI | 25.5 | 19.7 | 24.1 | 23.4 | 32.8 | 59.9 |
| AR | 1.23 | 1.23 | 1.33 | 1.34 | 1.05 | 1.23 |
| MF | 72.8 | 79.1 | 73.2 | 74.6 | 66.6 | 34.7 |
| ∑REE | 414.67 | 464.75 | 367.31 | 449.79 | 260.28 | 46.02 |
| (La/Yb)n | 6.02 | 17.04 | 5.15 | 7.38 | 8.67 | 4.18 |
| La/Sm | 1.64 | 2.29 | 1.38 | 2.06 | 1.66 | 1.43 |
| 87Sr/86Sr | 0.7103 | 0.72848 | 0.71018 | 0.71158 | 0.70804 | 0.71734 |
| 143Nd/144Nd | 0.512222 | 0.512043 | 0.512309 | 0.5122 | 0.512307 | 0.512352 |
| 87Rb/86Sr | 0.085 | 0.510 | 0.308 | 0.458 | 0.025 | 2.814 |
| 147Sm/144Nd | 0.1534 | 0.1414 | 0.1532 | 0.1473 | 0.1505 | 0.1662 |
| **εNd(t)** | -6.74 | -9.85 | -5.03 | -6.97 | -4.98 | -4.61 |
| Isr | 0.709997 | 0.726667 | 0.709086 | 0.709952 | 0.707953 | 0.707333 |

续上表

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 样品号 | 17SJ01-7 | 17SJ01-8 | 15DJ13-1 | 15DJ13-2 | 15DJ13-10 | 15DJ13-20 | 15DJ13-30 |
| 采样地 | 阳春三甲双井 | 高州大井上平 |
| 岩性 | 辉石岩 | 角闪岩 |
| SiO2 | 47.78 | 48.67 | 37.63 | 37.37 | 41.23 | 39.77 | 43.42 |
| TiO2 | 0.88 | 0.75 | 2.87 | 2.86 | 1.88 | 2.63 | 1.90 |
| Al2O3 | 5.18 | 5.12 | 7.50 | 7.47 | 8.04 | 10.50 | 6.41 |
| Fe2O3 | 2.04 | 1.10 | 8.98 | 9.72 | 4.15 | 4.81 | 5.30 |
| FeO | 7.55 | 5.68 | 13.60 | 13.45 | 14.20 | 14.80 | 12.20 |
| MnO | 0.16 | 0.10 | 0.26 | 0.26 | 0.28 | 0.26 | 0.24 |
| MgO | 15.70 | 17.05 | 6.99 | 6.90 | 7.01 | 6.90 | 7.50 |
| CaO | 14.90 | 16.07 | 14.59 | 14.50 | 15.70 | 12.20 | 15.96 |
| Na2O | 0.39 | 0.33 | 1.11 | 1.11 | 0.96 | 1.54 | 0.94 |
| K2O | 2.21 | 2.44 | 0.97 | 0.98 | 1.50 | 1.56 | 0.88 |
| P2O5 | 0.08 | 0.19 | 2.79 | 2.76 | 2.52 | 2.14 | 2.74 |
| S | 0.42 | 0.01 |  |  |  |  |  |
| H2O+ |  |  | 1.87 | 1.71 | 1.80 | 2.63 | 1.68 |
| CO2 |  |  | 0.26 | 0.26 | 0.50 | 0.02 | 0.15 |
| LOST | 2.10 | 1.44 | 0.97 | 0.90 | 0.73 | 1.03 | 1.34 |
| Total | 99.38 | 98.94 | 100.41 | 100.26 | 100.51 | 100.78 | 100.66 |
| FeOT | 9.39 | 6.67 | 21.68 | 22.19 | 17.93 | 19.13 | 16.97 |
| Fe2O3T | 10.43 | 7.41 | 24.09 | 24.66 | 19.93 | 21.25 | 18.86 |
| Mg# | 79 | 84 | 48 | 48 | 47 | 45 | 52 |
| La | 2.73 | 4.3 | 34.4 | 34.6 | 35.8 | 30.7 | 23.5 |
| Ce | 10.3 | 13.7 | 95.6 | 95.0 | 97.0 | 75.3 | 60.1 |
| Pr | 1.71 | 2.09 | 13.4 | 13.4 | 14.1 | 12.3 | 9.34 |
| Nd | 9.44 | 11 | 65.5 | 65.4 | 68.2 | 61.0 | 46.6 |
| Sm | 2.86 | 2.93 | 15.9 | 15.9 | 16.7 | 15.3 | 11.1 |
| Eu | 0.7 | 0.73 | 3.63 | 3.56 | 3.96 | 3.83 | 2.64 |
| Gd | 2.24 | 2.18 | 14.2 | 14.3 | 14.5 | 13.5 | 9.88 |
| Tb | 0.36 | 0.31 | 1.76 | 1.75 | 1.86 | 1.80 | 1.26 |
| Dy | 2.05 | 1.43 | 8.91 | 8.98 | 9.84 | 9.38 | 6.61 |
| Ho | 0.37 | 0.23 | 1.53 | 1.56 | 1.68 | 1.57 | 1.11 |
| Er | 0.89 | 0.51 | 3.74 | 3.97 | 4.24 | 3.83 | 2.72 |
| Tm | 0.13 | 0.067 | 0.46 | 0.46 | 0.53 | 0.49 | 0.34 |
| Yb | 0.79 | 0.39 | 2.62 | 2.57 | 3.17 | 2.75 | 2.06 |
| Lu | 0.099 | 0.055 | 0.35 | 0.37 | 0.43 | 0.37 | 0.27 |
| Sc | 71.5 | 60.1 | 62.1 | 63.3 | 62.4 | 61.3 | 64.2 |
| V | 272 | 157 | 556 | 566 | 588 | 479 | 615 |
| Cr | 140 | 1630 | 117 | 123 | 93.4 | 131 | 164 |
| Co | 82.3 | 58.8 | 52.4 | 55.3 | 52.0 | 44.1 | 68.6 |
| Ni | 84.1 | 136 | 21.4 | 22.3 | 16.8 | 21.5 | 41.1 |
| Cu | 358 | 81 | 58.6 | 59.1 | 42.6 | 34.8 | 162 |
| Zn | 61 | 35.8 | 161 | 162 | 151 | 164 | 120 |
| Ga | 8.7 | 7.93 | 20.9 | 21.2 | 17.8 | 20.7 | 16.4 |
| Rb | 150 | 159 | 12.4 | 12.8 | 34.3 | 31.3 | 11.7 |
| Sr | 79.2 | 123 | 338 | 348 | 320 | 354 | 230 |
| Y | 7.98 | 5.07 | 39.6 | 40.6 | 44.6 | 41.2 | 29.0 |
| Zr | 8.08 | 8.01 | 61.5 | 67.3 | 94.8 | 52.3 | 40.7 |
| Nb | 4.07 | 3.67 | 6.64 | 6.68 | 6.38 | 7.47 | 3.99 |
| Mo | 0.21 | 0.46 | 0.58 | 0.51 | 0.67 | 1.39 | 0.75 |
| Sn | 5.65 | 3.74 | 3.04 | 3.17 | 2.62 | 2.92 | 3.63 |
| Ba | 258 | 246 | 127 | 129 | 192 | 291 | 88.5 |
| Hf | 0.4 | 0.38 | 2.42 | 2.59 | 3.12 | 2.11 | 1.68 |
| Ta | 0.66 | 0.74 | 0.37 | 0.38 | 0.35 | 0.36 | 0.25 |
| Pb | 4.12 | 3.25 | 5.27 | 5.31 | 5.65 | 6.88 | 5.24 |
| Th | 0.21 | 0.37 | 3.83 | 3.56 | 4.05 | 2.61 | 2.60 |
| U | 0.075 | 0.15 | 0.89 | 0.90 | 1.36 | 0.83 | 1.11 |
| SI | 56.3 | 64.1 | 22.1 | 21.4 | 25.2 | 23.3 | 28.0 |
| AR | 1.30 | 1.30 | 1.21 | 1.21 | 1.23 | 1.32 | 1.18 |
| MF | 37.9 | 28.5 | 76.3 | 77.1 | 72.3 | 74.0 | 70.0 |
| ∑REE | 34.67 | 39.92 | 262.06 | 261.81 | 272.08 | 232.15 | 177.55 |
| (La/Yb)n | 2.48 | 7.91 | 9.42 | 9.64 | 8.10 | 8.02 | 8.20 |
| La/Sm | 0.95 | 1.47 | 2.17 | 2.17 | 2.15 | 2.01 | 2.13 |
| 87Sr/86Sr | 0.72734 | 0.71476 |  |  | 0.709 | 0.70898 | 0.70859 |
| 143Nd/144Nd | 0.512194 | 0.512403 |  |  | 0.512281 | 0.512281 | 0.512318 |
| 87Rb/86Sr | 5.490 | 3.743 |  |  | 0.310 | 0.256 | 0.147 |
| 147Sm/144Nd | 0.1831 | 0.1610 |  |  | 0.1480 | 0.1516 | 0.1435 |
| **εNd(t)** | -8.23 | -3.45 |  |  | -5.41 | -5.53 | -4.55 |
| Isr | 0.707815 | 0.701450 |  |  | 0.707898 | 0.708071 | 0.708067 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 样品号 | 15SD25-1 | 15SD25-2 | 15SD25-21 | 15SD25-22 | 15SD25-23 |
| 采样地 | 高州东岸上垌 |
| 岩性 | 石榴斜长角闪岩 |
| SiO2 | 41.71 | 42.19 | 37.42 | 48.27 | 36.44 |
| TiO2 | 1.20 | 1.09 | 2.81 | 0.56 | 2.36 |
| Al2O3 | 17.73 | 18.31 | 8.01 | 17.86 | 5.68 |
| Fe2O3 | 4.69 | 5.35 | 8.17 | 2.01 | 12.96 |
| FeO | 10.70 | 9.60 | 9.77 | 8.22 | 12.04 |
| MnO | 0.30 | 0.27 | 0.22 | 0.17 | 0.21 |
| MgO | 7.22 | 6.94 | 8.72 | 7.49 | 8.74 |
| CaO | 10.44 | 10.15 | 15.89 | 10.81 | 14.63 |
| Na2O | 1.60 | 1.76 | 1.07 | 1.52 | 0.69 |
| K2O | 1.22 | 1.35 | 0.82 | 1.09 | 0.61 |
| P2O5 | 0.20 | 0.23 | 4.16 | 0.09 | 3.07 |
| S |  |  | 0.43 | 0.40 | 0.01 |
| H2O+ | 2.38 | 2.52 |  |  |  |
| CO2 | 0.14 | 0.08 |  |  |  |
| LOST | 1.59 | 1.50 | 1.63 | 0.86 | 0.96 |
| Total | 101.13 | 101.34 | 99.13 | 99.35 | 98.41 |
| FeOT | 14.92 | 14.41 | 17.12 | 10.03 | 23.70 |
| Fe2O3T | 16.58 | 16.02 | 19.03 | 11.14 | 26.34 |
| Mg# | 55 | 56 | 61 | 62 | 56 |
| La | 9.10 | 8.78 | 22.2 | 8.46 | 28.2 |
| Ce | 19.6 | 18.8 | 65.8 | 20.5 | 66.8 |
| Pr | 3.24 | 3.16 | 9.58 | 2.59 | 11.5 |
| Nd | 17.3 | 16.5 | 49.2 | 11.8 | 62.6 |
| Sm | 5.80 | 5.74 | 12.8 | 3.29 | 16.6 |
| Eu | 1.67 | 1.63 | 3.32 | 0.77 | 4.41 |
| Gd | 7.36 | 6.83 | 10.5 | 3.28 | 15 |
| Tb | 1.28 | 1.23 | 1.53 | 0.65 | 2.16 |
| Dy | 8.42 | 7.78 | 8.2 | 4.36 | 11.5 |
| Ho | 1.69 | 1.54 | 1.51 | 0.91 | 2.13 |
| Er | 4.76 | 4.22 | 3.64 | 2.5 | 5.12 |
| Tm | 0.67 | 0.64 | 0.5 | 0.4 | 0.69 |
| Yb | 4.13 | 3.92 | 2.91 | 2.69 | 4.01 |
| Lu | 0.57 | 0.55 | 0.38 | 0.37 | 0.54 |
| Sc | 46.7 | 43.8 | 78.2 | 35.7 | 85.9 |
| V | 387 | 357 | 542 | 201 | 898 |
| Cr | 188 | 141 | 56.6 | 54 | 54.8 |
| Co | 54.6 | 45.0 | 50.3 | 53.9 | 73.8 |
| Ni | 38.3 | 27.1 | 26.6 | 41.5 | 30.8 |
| Cu | 83.3 | 47.0 | 100 | 107 | 137 |
| Zn | 104 | 97.3 | 111 | 75.8 | 157 |
| Ga | 17.9 | 17.5 | 14.8 | 15.6 | 12.9 |
| Rb | 32.0 | 40.7 | 14.4 | 45.8 | 10.9 |
| Sr | 363 | 346 | 370 | 296 | 233 |
| Y | 45.8 | 42.5 | 33.1 | 21.9 | 58.1 |
| Zr | 32.6 | 37.8 | 35.3 | 48.2 | 35.2 |
| Nb | 3.76 | 3.44 | 6.94 | 5.23 | 3.74 |
| Mo | 7.75 | 0.37 | 0.96 | 0.74 | 0.9 |
| Sn | 1.96 | 1.71 | 2.38 | 1.95 | 2.22 |
| Ba | 82.5 | 95.4 | 127 | 88.4 | 101 |
| Hf | 1.20 | 1.29 | 1.66 | 1.63 | 1.42 |
| Ta | 0.20 | 0.18 | 0.45 | 0.37 | 0.2 |
| Pb | 4.51 | 4.24 | 4.13 | 5.33 | 3.89 |
| Th | 2.23 | 1.93 | 1.32 | 2.08 | 2.04 |
| U | 0.26 | 0.29 | 0.44 | 0.29 | 0.56 |
| SI | 28.4 | 27.8 | 30.5 | 36.8 | 24.9 |
| AR | 1.22 | 1.25 | 1.17 | 1.20 | 1.14 |
| MF | 68.1 | 68.3 | 67.3 | 57.7 | 74.1 |
| ∑REE | 85.58 | 81.29 | 192.07 | 62.57 | 231.26 |
| (La/Yb)n | 1.58 | 1.60 | 5.47 | 2.26 | 5.04 |
| La/Sm | 1.57 | 1.53 | 1.73 | 2.57 | 1.70 |
| 87Sr/86Sr | 0.70962 | 0.70983 | 0.70779 | 0.71184 | 0.70752 |
| 143Nd/144Nd | 0.512342 | 0.51234 | 0.51231 | 0.512164 | 0.51233 |
| 87Rb/86Sr | 0.255 | 0.340 | 0.113 | 0.448 | 0.135 |
| 147Sm/144Nd | 0.2034 | 0.2107 | 0.1573 | 0.1685 | 0.1603 |
| **εNd(t)** | -5.99 | -6.26 | -5.14 | -8.35 | -4.85 |
| Isr | 0.708712 | 0.708620 | 0.707390 | 0.710247 | 0.707039 |

注：Mg# = 100×Mg/(Mg+Fe2+).

附表2 锆石U-Pb-O同位素测试结果

Appendix table 2 Zircon U-Pb-O isotopic data of ultramafic rocks from Yunkai.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **分析点号** | **Th****/10-6** | **U****/10-6** | **Th/U** | **同位素比值** |  | **同位素年龄/Ma** | **谐和度** |  |  |
| **207Pb/****206Pb** | **1σ** | **207Pb/****235U** | **1σ** | **206Pb/****238U** | **1σ** |  | **207Pb/****206Pb** | **1σ** | **207Pb/****235U** | **1σ** | **206Pb/****238U** | **1σ** | **δ18O** | **1σ** |
| **15SD25-1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15SD25-1-25 | 54.6  | 240  | 0.23  | 0.0500  | 0.0034  | 0.2846  | 0.0162  | 0.0421  | 0.0007  |  | 195  | 159  | 254  | 12.8  | 266  | 4.5  | 95% |  |  |
| 15SD25-1-27 | 0.24  | 34.3  | 0.01  | 0.0666  | 0.0143  | 0.2780  | 0.0397  | 0.0382  | 0.0018  |  | 833  | 460  | 249  | 31.6  | 241  | 11.1  | 96% |  |  |
| 15SD25-1-28 | 75.2  | 581  | 0.13  | 0.0525  | 0.0043  | 0.2932  | 0.0221  | 0.0410  | 0.0005  |  | 309  | 182  | 261  | 17.3  | 259  | 3.0  | 99% |  |  |
| 15SD25-1-30 | 38.7  | 242  | 0.16  | 0.0546  | 0.0037  | 0.2785  | 0.0171  | 0.0381  | 0.0007  |  | 394  | 154  | 249  | 13.6  | 241  | 4.0  | 96% |  |  |
| 15SD25-1-31 | 0.23  | 34.6  | 0.01  | 0.0718  | 0.0154  | 0.2999  | 0.0400  | 0.0411  | 0.0018  |  | 981  | 444  | 266  | 31.3  | 260  | 11.0  | 97% |  |  |
| 15SD25-1-33 | 76.1  | 300  | 0.25  | 0.0533  | 0.0036  | 0.2852  | 0.0165  | 0.0401  | 0.0007  |  | 343  | 156  | 255  | 13.1  | 253  | 4.3  | 99% |  |  |
| 15SD25-1-34 | 184  | 694  | 0.27  | 0.0505  | 0.0023  | 0.2811  | 0.0123  | 0.0405  | 0.0005  |  | 217  | 103.7  | 252  | 9.8  | 256  | 3.0  | 98% |  |  |
| 15SD25-1-35 | 166  | 321  | 0.52  | 0.0517  | 0.0032  | 0.2675  | 0.0149  | 0.0380  | 0.0006  |  | 272  | 143  | 241  | 11.9  | 240  | 3.9  | 99% |  |  |
| 15SD25-1-36 | 1.11  | 118  | 0.01  | 0.0504  | 0.0061  | 0.2576  | 0.0309  | 0.0377  | 0.0011  |  | 213  | 259  | 233  | 25.0  | 239  | 6.6  | 97% |  |  |
| 15SD25-1-37 | 34.8  | 252  | 0.14  | 0.0565  | 0.0038  | 0.3119  | 0.0199  | 0.0408  | 0.0007  |  | 478  | 148  | 276  | 15.4  | 258  | 4.3  | 93% |  |  |
| 15SD25-1-38 | 65.5  | 273  | 0.24  | 0.0523  | 0.0036  | 0.2710  | 0.0168  | 0.0384  | 0.0006  |  | 298  | 125  | 243  | 13.5  | 243  | 3.8  | 99% |  |  |
| 15SD25-1-39 | 205  | 618  | 0.33  | 0.0518  | 0.0025  | 0.2913  | 0.0129  | 0.0411  | 0.0005  |  | 276  | 109  | 260  | 10.1  | 260  | 3.0  | 99% |  |  |
| 15SD25-1-40 | 1.00  | 25.8  | 0.04  | 0.0680  | 0.0167  | 0.2330  | 0.0326  | 0.0334  | 0.0016  |  | 878  | 530  | 213  | 26.9  | 212  | 10.2  | 99% |  |  |
| 15SD25-1-41 | 8.74  | 57.7  | 0.15  | 0.0628  | 0.0094  | 0.3093  | 0.0432  | 0.0413  | 0.0014  |  | 702  | 323  | 274  | 33.5  | 261  | 8.5  | 95% |  |  |
| 15SD25-1-42 | 1.90  | 91.3  | 0.02  | 0.0551  | 0.0060  | 0.2655  | 0.0247  | 0.0375  | 0.0009  |  | 417  | 251  | 239  | 19.8  | 237  | 5.8  | 99% |  |  |
| 15SD25-1-43 | 54.4  | 284  | 0.19  | 0.0550  | 0.0039  | 0.3006  | 0.0177  | 0.0411  | 0.0007  |  | 413  | 155  | 267  | 13.8  | 260  | 4.4  | 97% |  |  |
| 15SD25-1-44 | 1.34  | 25.7  | 0.05  | 0.0934  | 0.0281  | 0.3218  | 0.0812  | 0.0395  | 0.0019  |  | 1498  | 601  | 283  | 62.4  | 250  | 11.7  | 87% |  |  |
| 15SD25-1-45 | 61.3  | 691  | 0.09  | 0.0524  | 0.0023  | 0.2962  | 0.0124  | 0.0411  | 0.0005  |  | 302  | 93.5  | 263  | 9.7  | 260  | 3.0  | 98% |  |  |
| 15SD25-1-46 | 2.36  | 90.2  | 0.03  | 0.0588  | 0.0088  | 0.2714  | 0.0258  | 0.0379  | 0.0011  |  | 567  | 330  | 244  | 20.6  | 240  | 6.9  | 98% |  |  |
| 15SD25-1-47 | 0.48  | 98.8  | 0.00  | 0.0586  | 0.0058  | 0.3053  | 0.0249  | 0.0391  | 0.0012  |  | 554  | 223  | 271  | 19.4  | 248  | 7.2  | 91% |  |  |
| 15SD25-1-48 | 350  | 497  | 0.70  | 0.0568  | 0.0032  | 0.3222  | 0.0172  | 0.0415  | 0.0006  |  | 483  | 129  | 284  | 13.2  | 262  | 3.9  | 92% |  |  |
| **15DJ13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 15DJ13-1  | 91  | 168  | 0.56  | 0.0524 | 0.0025  | 0.276 | 0.014  | 0.03816 | 0.0007  |  | 304 | 110 |  |  | 241.4 | 4.2 |  | 9.32 | 0.22 |
| 15DJ13-2  | 575  | 537  | 1.11  | 0.0511 | 0.0011  | 0.2877 | 0.007  | 0.04086 | 0.0006  |  | 244 | 49 |  |  | 258.2 | 3.9 |  | 8.80 | 0.16 |
| 15DJ13-3  | 302  | 509  | 0.61  | 0.0508 | 0.0013  | 0.2794 | 0.008  | 0.03989 | 0.0006  |  | 232 | 58 |  |  | 252.1 | 3.9 |  | 9.00 | 0.20 |
| 15DJ13-4  | 184  | 348  | 0.55  | 0.0521 | 0.0016  | 0.2868 | 0.010  | 0.03996 | 0.0006  |  | 288 | 70 |  |  | 252.6 | 4 |  | 8.70 | 0.37 |
| 15DJ13-5  | 91  | 170  | 0.56  | 0.0516 | 0.0020  | 0.293 | 0.012  | 0.04115 | 0.0007  |  | 268 | 89 |  |  | 259.9 | 4.4 |  | 7.01 | 0.42 |
| 15DJ13-6  | 87  | 211  | 0.43  | 0.0515 | 0.0030  | 0.285 | 0.017  | 0.04007 | 0.0007  |  | 265 | 130 |  |  | 253.2 | 4.3 |  | 8.93 | 0.25 |
| 15DJ13-7  | 21  | 50  | 0.42  | 0.0523 | 0.0068  | 0.293 | 0.038  | 0.0406 | 0.0010  |  | 298 | 300 |  |  | 256.6 | 6.1 |  | 9.71 | 0.15 |
| 15DJ13-8  | 88  | 348  | 0.26  | 0.0516 | 0.0023  | 0.289 | 0.013  | 0.04062 | 0.0005  |  | 267 | 100 |  |  | 256.7 | 3.1 |  | 8.53 | 0.12 |
| 15DJ13-9  | 99  | 182  | 0.56  | 0.0506 | 0.0025  | 0.281 | 0.014  | 0.04022 | 0.0006  |  | 224 | 110 |  |  | 254.2 | 3.4 |  | 8.93 | 0.25 |
| 15DJ13-10  | 95  | 182  | 0.54  | 0.0501 | 0.0035  | 0.28 | 0.020  | 0.04046 | 0.0006  |  | 202 | 160 |  |  | 255.7 | 3.9 |  | 9.34 | 0.22 |
| 15DJ13-11  | 437  | 432  | 1.05  | 0.0513 | 0.0014  | 0.277 | 0.008  | 0.03916 | 0.0005  |  | 254 | 64 |  |  | 247.6 | 2.8 |  | 8.72 | 0.20 |
| 15DJ13-12  | 45  | 96  | 0.49  | 0.0513 | 0.0042  | 0.27 | 0.023  | 0.03821 | 0.0006  |  | 255 | 190 |  |  | 241.7 | 4.1 |  | 8.82 | 0.27 |
| **17SJ01-11** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17SJ01-11-01 | 1067  | 824  | 1.30  | 0.0496  | 0.0019  | 0.2773  | 0.0102  | 0.0410  | 0.0006  |  | 176  | 88.9  | 249  | 8.1  | 259  | 3.6  | 95% |  |  |
| 17SJ01-11-02 | 1033  | 686  | 1.51  | 0.0467  | 0.0020  | 0.2601  | 0.0112  | 0.0405  | 0.0006  |  | 35.3  | 165  | 235  | 9.0  | 256  | 3.5  | 91% |  |  |
| 17SJ01-11-03 | 720  | 563  | 1.28  | 0.0473  | 0.0021  | 0.2617  | 0.0113  | 0.0405  | 0.0006  |  | 64.9  | 104  | 236  | 9.1  | 256  | 3.6  | 91% |  |  |
| 17SJ01-11-04 | 1619  | 1193  | 1.36  | 0.0496  | 0.0019  | 0.2731  | 0.0104  | 0.0400  | 0.0005  |  | 176  | 90.7  | 245  | 8.3  | 253  | 3.3  | 96% |  |  |
| 17SJ01-11-05 | 1643  | 852  | 1.93  | 0.0481  | 0.0021  | 0.2651  | 0.0110  | 0.0402  | 0.0005  |  | 106  | 106  | 239  | 8.9  | 254  | 2.9  | 93% |  |  |
| 17SJ01-11-06 | 940  | 768  | 1.23  | 0.0534  | 0.0024  | 0.2950  | 0.0130  | 0.0399  | 0.0005  |  | 346  | 100.0  | 263  | 10.2  | 252  | 3.2  | 95% |  |  |
| 17SJ01-11-07 | 905  | 566  | 1.60  | 0.0518  | 0.0037  | 0.2832  | 0.0189  | 0.0402  | 0.0006  |  | 276  | 165  | 253  | 15.0  | 254  | 3.6  | 99% |  |  |
| 17SJ01-11-08 | 733  | 673  | 1.09  | 0.0473  | 0.0025  | 0.2631  | 0.0137  | 0.0404  | 0.0005  |  | 64.9  | 122  | 237  | 11.0  | 255  | 3.4  | 92% |  |  |
| 17SJ01-11-09 | 1079  | 1164  | 0.93  | 0.0494  | 0.0021  | 0.2755  | 0.0119  | 0.0402  | 0.0006  |  | 169  | 100.0  | 247  | 9.5  | 254  | 3.5  | 97% |  |  |
| 17SJ01-11-10 | 2019  | 1030  | 1.96  | 0.0464  | 0.0018  | 0.2564  | 0.0097  | 0.0401  | 0.0005  |  | 20.5  | 88.9  | 232  | 7.9  | 253  | 3.3  | 91% |  |  |
| 17SJ01-11-11 | 813  | 556  | 1.46  | 0.0488  | 0.0023  | 0.2698  | 0.0125  | 0.0404  | 0.0006  |  | 200  | 105  | 243  | 10.0  | 256  | 3.7  | 94% |  |  |
| 17SJ01-11-12 | 1584  | 876  | 1.81  | 0.0473  | 0.0020  | 0.2606  | 0.0106  | 0.0403  | 0.0005  |  | 61.2  | 100.0  | 235  | 8.5  | 255  | 3.1  | 92% |  |  |
| 17SJ01-11-13 | 1789  | 1863  | 0.96  | 0.0483  | 0.0016  | 0.2684  | 0.0088  | 0.0404  | 0.0005  |  | 122  | 79.6  | 241  | 7.1  | 256  | 3.0  | 94% |  |  |
| 17SJ01-11-14 | 790  | 680  | 1.16  | 0.0494  | 0.0025  | 0.2730  | 0.0133  | 0.0403  | 0.0006  |  | 165  | 119  | 245  | 10.6  | 255  | 3.6  | 96% |  |  |
| 17SJ01-11-15 | 2078  | 1272  | 1.63  | 0.0482  | 0.0019  | 0.2694  | 0.0105  | 0.0410  | 0.0006  |  | 109  | 93  | 242  | 8.4  | 259  | 3.6  | 93% |  |  |
| 17SJ01-11-16 | 1191  | 1271  | 0.94  | 0.0482  | 0.0019  | 0.2663  | 0.0109  | 0.0404  | 0.0007  |  | 106  | 94.4  | 240  | 8.8  | 255  | 4.2  | 93% |  |  |
| 17SJ01-11-17 | 896  | 763  | 1.17  | 0.0517  | 0.0022  | 0.2845  | 0.0121  | 0.0405  | 0.0006  |  | 272  | 96.3  | 254  | 9.5  | 256  | 3.9  | 99% |  |  |
| 17SJ01-11-18 | 1536  | 993  | 1.55  | 0.0474  | 0.0019  | 0.2627  | 0.0107  | 0.0405  | 0.0006  |  | 77.9  | 87.0  | 237  | 8.6  | 256  | 3.4  | 92% |  |  |
| 17SJ01-11-19 | 1153  | 680  | 1.70  | 0.0533  | 0.0023  | 0.2962  | 0.0131  | 0.0404  | 0.0006  |  | 343  | 100.0  | 263  | 10.3  | 255  | 3.6  | 96% |  |  |
| 17SJ01-11-20 | 851  | 536  | 1.59  | 0.0498  | 0.0025  | 0.2755  | 0.0130  | 0.0404  | 0.0006  |  | 183  | 119  | 247  | 10.4  | 255  | 3.6  | 96% |  |  |
| **17SJ01-12** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17SJ01-12-01 | 830  | 1235  | 0.67  | 0.0500  | 0.0025  | 0.2759  | 0.0147  | 0.0401  | 0.0005  |  | 198  | 117  | 247  | 11.7  | 254  | 3.3  | 97% |  |  |
| 17SJ01-12-02 | 386  | 991  | 0.39  | 0.0517  | 0.0029  | 0.2833  | 0.0160  | 0.0400  | 0.0005  |  | 272  | 97.2  | 253  | 12.6  | 253  | 3.3  | 99% |  |  |
| 17SJ01-12-03 | 198  | 469  | 0.42  | 0.0554  | 0.0038  | 0.3008  | 0.0182  | 0.0408  | 0.0007  |  | 428  | 119  | 267  | 14.2  | 258  | 4.3  | 96% |  |  |
| 17SJ01-12-04 | 557  | 1380  | 0.40  | 0.0594  | 0.0059  | 0.3318  | 0.0348  | 0.0404  | 0.0006  |  | 583  | 215  | 291  | 26.6  | 256  | 3.6  | 87% |  |  |
| 17SJ01-12-05 | 188  | 440  | 0.43  | 0.0467  | 0.0033  | 0.2592  | 0.0159  | 0.0407  | 0.0007  |  | 31.6  | 163  | 234  | 12.8  | 257  | 4.4  | 90% |  |  |
| 17SJ01-12-06 | 229  | 532  | 0.43  | 0.0632  | 0.0039  | 0.3450  | 0.0224  | 0.0398  | 0.0007  |  | 717  | 127  | 301  | 16.9  | 251  | 4.6  | 82% |  |  |
| 17SJ01-12-07 | 232  | 601  | 0.39  | 0.0507  | 0.0033  | 0.2723  | 0.0158  | 0.0402  | 0.0007  |  | 228  | 147  | 245  | 12.6  | 254  | 4.4  | 96% |  |  |
| 17SJ01-12-08 | 232  | 506  | 0.46  | 0.0509  | 0.0037  | 0.2779  | 0.0182  | 0.0408  | 0.0010  |  | 235  | 168  | 249  | 14.5  | 258  | 5.9  | 96% |  |  |
| 17SJ01-12-09 | 196  | 541  | 0.36  | 0.0536  | 0.0037  | 0.2744  | 0.0164  | 0.0393  | 0.0008  |  | 354  | 156  | 246  | 13.1  | 248  | 5.0  | 99% |  |  |
| 17SJ01-12-10 | 163  | 378  | 0.43  | 0.0505  | 0.0043  | 0.2599  | 0.0189  | 0.0392  | 0.0008  |  | 220  | 200  | 235  | 15.2  | 248  | 5.2  | 94% |  |  |
| 17SJ01-12-11 | 809  | 1869  | 0.43  | 0.0533  | 0.0020  | 0.2917  | 0.0111  | 0.0400  | 0.0007  |  | 343  | 87.0  | 260  | 8.7  | 253  | 4.2  | 97% |  |  |
| 17SJ01-12-12 | 811  | 1784  | 0.45  | 0.0496  | 0.0021  | 0.2752  | 0.0118  | 0.0402  | 0.0006  |  | 176  | 129  | 247  | 9.4  | 254  | 3.7  | 97% |  |  |
| 17SJ01-12-13 | 254  | 591  | 0.43  | 0.0513  | 0.0032  | 0.2789  | 0.0156  | 0.0402  | 0.0006  |  | 254  | 143  | 250  | 12.4  | 254  | 3.8  | 98% |  |  |
| 17SJ01-12-14 | 1970  | 2534  | 0.78  | 0.0515  | 0.0017  | 0.2847  | 0.0092  | 0.0401  | 0.0004  |  | 265  | 75.9  | 254  | 7.2  | 253  | 2.6  | 99% |  |  |
| 17SJ01-12-15 | 211  | 437  | 0.48  | 0.0515  | 0.0034  | 0.2801  | 0.0168  | 0.0406  | 0.0006  |  | 261  | 154  | 251  | 13.3  | 257  | 4.0  | 97% |  |  |
| 17SJ01-12-16 | 653  | 996  | 0.66  | 0.0517  | 0.0021  | 0.2866  | 0.0116  | 0.0403  | 0.0005  |  | 272  | 94.4  | 256  | 9.1  | 254  | 3.0  | 99% |  |  |
| 17SJ01-12-17 | 184  | 438  | 0.42  | 0.0511  | 0.0030  | 0.2771  | 0.0144  | 0.0393  | 0.0006  |  | 256  | 135.2  | 248  | 11.5  | 249  | 3.8  | 99% |  |  |
| 17SJ01-12-18 | 306  | 472  | 0.65  | 0.0518  | 0.0029  | 0.2789  | 0.0148  | 0.0392  | 0.0006  |  | 276  | 128  | 250  | 11.8  | 248  | 4.0  | 99% |  |  |
| 17SJ01-12-19 | 400  | 663  | 0.60  | 0.0510  | 0.0024  | 0.2820  | 0.0130  | 0.0405  | 0.0005  |  | 243  | 109  | 252  | 10.3  | 256  | 3.2  | 98% |  |  |
| 17SJ01-12-20 | 354  | 769  | 0.46  | 0.0544  | 0.0025  | 0.2933  | 0.0125  | 0.0394  | 0.0005  |  | 391  | 108  | 261  | 9.8  | 249  | 3.1  | 95% |  |  |

表3 锆石Lu-Hf同位素测试结果

Appendix table 3 Zircon Lu-Hf isotopic data of ultramafic rocks from Yunkai.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **176Yb/177Hf** | **** | **176Lu/177Hf** | **** | **176Hf/177Hf** | **** | **176Hf/177Hfi** | **eHf(0)** | **eHf(t)** | **TDM (Ma)** | **TDMC (Ma)** | **fLu/Hf** |
| 15DJ13-01 | 0.018665  | 0.000494  | 0.000770  | 0.000020  | 0.282443  | 0.000015  | 0.282440  | -11.6  | -6.5  | 1138  | 1684  | -0.98  |
| 15DJ13-02 | 0.022763  | 0.000313  | 0.000929  | 0.000012  | 0.282425  | 0.000018  | 0.282421  | -12.3  | -7.1  | 1167  | 1723  | -0.97  |
| 15DJ13-03 | 0.020571  | 0.000173  | 0.000862  | 0.000010  | 0.282476  | 0.000031  | 0.282472  | -10.5  | -5.4  | 1094  | 1612  | -0.97  |
| 15DJ13-04 | 0.030941  | 0.001469  | 0.001255  | 0.000056  | 0.282599  | 0.000072  | 0.282594  | -6.1  | -1.2  | 931  | 1341  | -0.96  |
| 15DJ13-05 | 0.022807  | 0.001130  | 0.000967  | 0.000049  | 0.282430  | 0.000017  | 0.282426  | -12.1  | -6.9  | 1162  | 1712  | -0.97  |
| 15DJ13-06 | 0.024703  | 0.000292  | 0.001019  | 0.000011  | 0.282435  | 0.000017  | 0.282430  | -11.9  | -6.7  | 1157  | 1701  | -0.97  |
| 15DJ13-07 | 0.018829  | 0.000615  | 0.000825  | 0.000027  | 0.282416  | 0.000020  | 0.282413  | -12.6  | -7.6  | 1177  | 1749  | -0.98  |
| 15DJ13-08 | 0.010406  | 0.000215  | 0.000471  | 0.000009  | 0.282400  | 0.000015  | 0.282398  | -13.1  | -8.0  | 1188  | 1778  | -0.99  |
| 15DJ13-09 | 0.020813  | 0.000319  | 0.000870  | 0.000014  | 0.282427  | 0.000019  | 0.282424  | -12.2  | -7.1  | 1162  | 1722  | -0.97  |
| 15DJ13-10 | 0.004264  | 0.000073  | 0.000190  | 0.000003  | 0.282351  | 0.000015  | 0.282350  | -14.9  | -9.5  | 1247  | 1881  | -0.99  |
| 15DJ13-11 | 0.029860  | 0.000918  | 0.001202  | 0.000037  | 0.282479  | 0.000017  | 0.282474  | -10.3  | -5.4  | 1099  | 1609  | -0.96  |
| 15DJ13-12 | 0.019404  | 0.000244  | 0.000839  | 0.000012  | 0.282398  | 0.000015  | 0.282394  | -13.2  | -8.0  | 1202  | 1782  | -0.97  |
| 15DJ13-13 | 0.034003  | 0.000820  | 0.001376  | 0.000033  | 0.282529  | 0.000019  | 0.282522  | -8.6  | -3.5  | 1035  | 1494  | -0.96  |
| 15DJ13-14 | 0.017338  | 0.000269  | 0.000692  | 0.000008  | 0.282453  | 0.000018  | 0.282450  | -11.3  | -6.2  | 1121  | 1663  | -0.98  |
| 15DJ13-15 | 0.010026  | 0.000283  | 0.000448  | 0.000014  | 0.282415  | 0.000017  | 0.282413  | -12.6  | -7.5  | 1167  | 1745  | -0.99  |
| 15DJ13-16 | 0.029483  | 0.000810  | 0.001180  | 0.000032  | 0.282475  | 0.000019  | 0.282470  | -10.5  | -5.5  | 1105  | 1617  | -0.96  |
| 15DJ13-17 | 0.010138  | 0.000307  | 0.000425  | 0.000013  | 0.282407  | 0.000017  | 0.282405  | -12.9  | -7.7  | 1177  | 1759  | -0.99  |
| 15DJ13-18 | 0.019668  | 0.000639  | 0.000811  | 0.000026  | 0.282422  | 0.000015  | 0.282418  | -12.4  | -7.3  | 1168  | 1733  | -0.98  |
| 15DJ13-19 | 0.024291  | 0.000523  | 0.001017  | 0.000019  | 0.282447  | 0.000017  | 0.282442  | -11.5  | -6.3  | 1140  | 1676  | -0.97  |
| 15DJ13-20 | 0.021469  | 0.000111  | 0.000880  | 0.000005  | 0.282441  | 0.000014  | 0.282436  | -11.7  | -6.4  | 1145  | 1686  | -0.97  |
| 15DJ13-21 | 0.019735  | 0.000366  | 0.000884  | 0.000016  | 0.282445  | 0.000020  | 0.282441  | -11.6  | -6.3  | 1138  | 1675  | -0.97  |
| 15DJ13-22 | 0.017260  | 0.000220  | 0.000721  | 0.000008  | 0.282430  | 0.000021  | 0.282427  | -12.1  | -6.9  | 1154  | 1711  | -0.98  |
| 15DJ13-23 | 0.018807  | 0.000299  | 0.000801  | 0.000009  | 0.282444  | 0.000017  | 0.282440  | -11.6  | -6.3  | 1137  | 1678  | -0.98  |
| 15DJ13-25 | 0.024794  | 0.000363  | 0.001040  | 0.000010  | 0.282475  | 0.000024  | 0.282470  | -10.5  | -5.3  | 1101  | 1612  | -0.97  |