Supplementary Information for

**Oxygen controls on magmatism in rocky exoplanets**

Yanhao Lin\(^a,1\), Wim van Westrenen\(^a,b\), Ho-Kwang Mao\(^a\)

\(^a\)Center for High Pressure Science and Technology Advanced Research, Beijing 100094, People’s Republic of China
\(^b\)Department of Earth Sciences, Faculty of Science, Vrije Universiteit Amsterdam, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands

\(^1\)Corresponding author: Yanhao Lin
Email: yanhao.lin@hpstar.ac.cn

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Tables S1
## Table S1. Summary of electron microscope analysis results.

| Exp.     | T (°C) | P | Duration (hrs) | Log/O₂ | Glass     | Ox | TiO₂ | Al₂O₃ | MgO | CaO | Na₂O | K₂O | Phase proportion (modal %) |
|----------|--------|---|----------------|--------|-----------|----|------|-------|-----|-----|------|-----|--------------------------|
|          |        |   |                |        |           |    |      |       |     |     |      |     |                          |
| FefredW6  | 1280   | 24|                |        | 55.94     | 1.59| 18.01| 9.69  | 11.99| 2.74| 0.11 |     |                          |
| FefredW5  | 1250   | 24|                |        | 55.70     | 1.70| 17.93| 10.43| 12.07| 2.06| 0.05 | 100 |                          |
| FefredW7  | 1230   | 40|                |        | 56.70     | 1.47| 17.27| 10.36| 11.72| 2.27| 0.05 | 100 |                          |
| FefredW4  | 1200   | 36|                |        | 57.50     | 0.15| 0.47| 38.96| 2.92 | -   | 0.10 | 8   |                |
| FefredW2  | 1150   | 36| CO-CO₂         | log/O₂ = 11.5 | 58.26 | 0.81| 0.43| 38.03| 2.89 | -   | 8    |      |      |                          |
| FefredW1  | 1100   | 36|                |        | 58.58 | 4.89| 14.36| 3.74 | 6.22 | 1.67 | 0.57 | 18  |                          |
| FefredW5  | 1150   | 36|                |        | 59.49     | 5.41| 5.85| 22.37| 18.31| -   | 30   |      |      |                          |
| Fefree-7_3| 1230   | 40|                |        | 59.06     | 1.41| 19.20| 9.02 | 12.51| 2.56| 0.22 | 100 |                          |
| Fefree-7_1| 1200   | 36| CO-CO₂         | log/O₂ = 17 | 59.52 | -| 2.43| 37.71| 4.31 | -   | 6    |      |      |                          |
| Fefree-7_2| 1150   | 1 atm|                |        | 58.65     | 5.50| 18.01| 0.62 | 9.66 | 3.54 | 17   | 58  |                          |
|          |        |   |                |        | 58.38     | 2.12| 12.89| 27.95| 3.77 | -   | 8    |      |      |                          |
|          |        |   |                |        | 52.81 | 1.48| 2.89| 24.14| 18.67| -   | 20   |      |      |                          |
|          |        |   |                |        | 51.73 | 0.09| 30.33| 0.54 | 13.72| 3.59 | 43   |      |      |                          |
|          |        |   |                |        | 65.81 | 3.94| 15.55| 5.21 | 7.23 | 2.61 | 0.24 | 29  |      |                          |
| Fefree3  | 1160   | 36|                |        | 58.58     | 1.45| 18.19| 9.53 | 12.07| 2.77 | 0.10 | 100 |                          |
| Fefree4  | 1140   | 36|                |        | 58.56     | 1.66| 15.77| 10.00| 11.96| 2.64 | 0.11 | 100 |                          |
| Fefree15 | 1130   | 36|                |        | 39.50 | 0.04| -   | 60.40| -   | -   | 1    |      |      |                          |
| Fefree5  | 1100   | 36|                |        | 53.11 | 0.44| 2.71| 25.10| 18.65| -   | 8    |      |      |                          |
| Fefree7  | 1090   | 36| In air (log/O₂ = -1) | | 57.48 | 1.80| 16.80| 10.71| 10.81| 2.71| 0.10 | 73  |      |                          |
| Fefree8  | 1050   | 36|                |        | 58.58     | 0.42| 0.71| 39.12| 3.99 | -   | 7    |      |      |                          |
| Fefree9  | 1000   | 36|                |        | 52.75 | 0.19| 2.86| 24.20| 19.01| -   | 15   |      |      |                          |
|          |        |   |                |        | 52.03 | 0.26| 30.03| 0.26 | 13.51| 3.60 | 35   |      |      |                          |
|          |        |   |                |        | 52.78 | 0.71| 16.10| 7.32 | 9.44 | 3.19 | 43   |      |      |                          |
|          |        |   |                |        | 57.41 | 0.94| 1.99| 37.63| 3.42 | -   | 7    |      |      |                          |
|          |        |   |                |        | 57.13 | 1.67| 1.95| 23.79| 18.24| -   | 22   |      |      |                          |
|          |        |   |                |        | 57.13 | 1.67| 2.41| 27.41| 0.98 | 13.20| 3.72 | 44   |      |      |                          |
|          |        |   |                |        | 64.22 | 4.37| 14.91| 6.28 | 7.45 | 2.25 | 0.55 | 27  |      |                          |
|          |        |   |                |        | 57.13 | 0.57| 0.21| 38.44| 3.87 | -   | 11   |      |      |                          |
|          |        |   |                |        | 52.15 | 1.51| 3.72| 23.00| 18.72 | - | 23   |      |      |                          |
|          |        |   |                |        | 51.85 | 0.18| 10.61| 0.21 | 13.99| 3.55 | 50   |      |      |                          |
|          |        |   |                |        | 67.84 | 0.25| 0.10| 62.00| 2.21 | 1.34 | 0.06 | 15  |      |                          |

T, temperature; P, pressure; n, number of analyses; Duration here represents the time stable at the aim temperature;

Mineral abbreviations: Ol, olivine; Opx, orthopyroxene; Cpx, clinopyroxene; Pl, plagioclase; Ra, rutile;

Phase proportion calculated using least squares mass balance, and compositions from SEM in wt. % oxides;

Standard deviations based on multiple analyses for each phase is less than 2%; ‘-’ means the value lowers than the detection limit.