## Appendix 4 – Magnetite/Chromite Martian Meteorite References

1. Aoudjehane, H.C., Avice, G., Barrat, J.A., Boudouma, O., Chen, G., Duke, M.J.M., Franchi, I.A., Gattacceca, J., Grady, M.M., Greenwood, R.C., and Herd, C.D.K. (2012) Tissint martian meteorite: A fresh look at the interior, surface, and atmosphere of Mars. Science, 338(6108), 785-788.
2. Balta, J.B., Sanborn, M., McSween, H.Y., and Wadhwa, M. (2013) Magmatic history and parental melt composition of olivine-phyric shergottite LAR 06319: Importance of magmatic degassing and olivine antecrysts in Martian magmatism. Meteoritics & Planetary Science, 48(8), 1359-1382.
3. Balta, J.B., Sanborn, M.E., Udry, A., Wadhwa, M., and McSween, H.Y. (2015) Petrology and trace element geochemistry of Tissint, the newest shergottite fall. Meteoritics & Planetary Science, 50(1), 63-85.
4. Barrat, J.A., Jambon, A., Bohn, M., Gillet, P., Sautter, V., Göpel, C., Lesourd, M., and Keller, F. (2002) Petrology and chemistry of the picritic shergottite North West Africa 1068 (NWA 1068). Geochimica et Cosmochimica Acta, 66(19), 3505-3518.
5. Basu Sarbadhikari, A., Babu, E.V.S.S.K., Vijaya Kumar, T., and Chennaoui Aoudjehane, H. (2016) Martian meteorite Tissint records unique petrogenesis among the depleted shergottites. Meteoritics & Planetary Science, 51(9), 1588-1610.
6. Beck, P., Barrat, J.A., Gillet, P., Wadhwa, M., Franchi, I.A., Greenwood, R.C., Bohn, M., Cotten, J., Van de Moortèle, B., and Reynard, B. (2006) Petrography and geochemistry of the chassignite Northwest Africa 2737 (NWA 2737). Geochimica et Cosmochimica Acta, 70(8), 2127-2139.
7. Bunch, T.E., and Reid, A.M. (1975) The nakhlites Part I: Petrography and mineral chemistry. Meteoritics & Planetary Science, 10(4), 303-315.
8. Day, J., Taylor, L.A., Floss, C., and McSween, H.Y. (2006) Petrology and chemistry of MIL 03346 and its significance in understanding the petrogenesis of nakhlites on Mars. Meteoritics & Planetary Science, 41(4), 581-606.
9. Floran, R.J., Prinz, M., Hlava, P.F., Keil, K., Nehru, C.E., and Hinthorne, J.R. (1978) The Chassigny meteorite: A cumulate dunite with hydrous amphibole-bearing melt inclusions. Geochimica et Cosmochimica Acta, 42(8), 1213-1229.
10. Folco, L., Franchi, I.A., D'orazio, M., Rocchi, S., and Schultz, L. (2000) A new martian meteorite from the Sahara: The shergottite Dar al Gani 489. Meteoritics & Planetary Science, 35(4), 827-839.
11. Gattacceca, J., Rochette, P., Scorzelli, R.B., Munayco, P., Agee, C., Quesnel, Y., Cournède, C., and Geissman, J. (2014) Martian meteorites and Martian magnetic anomalies: A new perspective from NWA 7034. Geophysical Research Letters, 41(14), 4859-4864.
12. Gillet, P., Barrat, J.A., Beck, P., Marty, B., Greenwood, R.C., Franchi, I.A., Bohn, M., and Cotten, J. (2005) Petrology, geochemistry, and cosmic-ray exposure age of Iherzolitic shergottite Northwest Africa 1950. Meteoritics & Planetary Science, 40(8), 1175-1184.

13. Gleason, J.D., Kring, D.A., Hill, D.H., and Boynton, W.V. (1997) Petrography and bulk chemistry of Martian lherzolite LEW88516. Geochimica et Cosmochimica Acta, 61(18), 4007-4014.
14. Gnos, E., Hofmann, B., Franchi, I.A., Al-Kathiri, A., Huser, M., and Moser, L. (2002) Sayh al Uhaymir 094: A new martian meteorite from the Oman desert. Meteoritics & Planetary Science, 37(6), 835-854.
15. Goodrich, C.A. (2003) Petrogenesis of olivine-phyric shergottites Sayh al Uhaymir 005 and Elephant Moraine A79001 lithology A. Geochimica et Cosmochimica Acta, 67(19), 3735-3772.
16. Goodrich, C.A., Herd, C.D., and Taylor, L.A. (2003) Spinels and oxygen fugacity in olivine-phyric and lherzolitic shergottites. Meteoritics & Planetary Science, 38(12), 1773-1792.
17. Greshake, A., Fritz, J., and Stöffler, D. (2004) Petrology and shock metamorphism of the olivine-phyric shergottite Yamato 980459: Evidence for a two-stage cooling and a single-stage ejection history1 1Associate editor: C. Koeberl. Geochimica et Cosmochimica Acta, 68(10), 2359-2377.
18. Gross, J., Filiberto, J., Herd, C.D., Daswani, M.M., Schwenzer, S.P., and Treiman, A.H. (2013) Petrography, mineral chemistry, and crystallization history of olivine-phyric shergottite NWA 6234: A new melt composition. Meteoritics & Planetary Science, 48(5), 854-871.
19. Gross, J., Treiman, A.H., Filiberto, J., and Herd, C.D. (2011) Primitive olivine-phyric shergottite NWA 5789: Petrography, mineral chemistry, and cooling history imply a magma similar to Yamato-980459. Meteoritics & Planetary Science, 46(1), 116-133.
20. Hale V. S. (1998) A Re-evaluation of cumulus pyroxene estimates and oxidation state for the Shergotty meteorite. M.S. Thesis, University of Tennessee, Knoxville, 105.
21. Harvey, R.P., Wadhwa, M., McSween, H.Y., and Crozaz, G. (1993) Petrography, mineral chemistry, and petrogenesis of Antarctic shergottite LEW88516. Geochimica et Cosmochimica Acta, 57(19), 4769-4783.
22. Herd, C.D., Papike, J.J., and Brearley, A.J. (2001) Oxygen fugacity of martian basalts from electron microprobe oxygen and TEM-EELS analyses of Fe-Ti oxides. American Mineralogist, 86(9), 1015-1024.
23. Hewins, R.H., Zanda, B., Humayun, M., Nemchin, A., Lorand, J.P., Pont, S., Deldicque, D., Bellucci, J.J., Beck, P., Leroux, H., and Marinova, M. (2017) Regolith breccia Northwest Africa 7533: Mineralogy and petrology with implications for early Mars. Meteoritics & Planetary Science, 52(1), 89-124.
24. Howarth, G.H., and Udry, A. (2017) Trace elements in olivine and the petrogenesis of the intermediate, olivine-phyric shergottite NWA 10170. Meteoritics & Planetary Science, 52(2), 391-409.
25. Howarth, G.H., Pernet-Fisher, J.F., Bodnar, R.J., and Taylor, L.A. (2015) Evidence for the exsolution of Cl-rich fluids in Martian magmas: Apatite petrogenesis in the enriched lherzolitic shergottite Northwest Africa 7755. Geochimica et Cosmochimica Acta, 166, 234-248.

26. Howarth, G.H., Pernet-Fisher, J.F., Balta, J.B., Barry, P.H., Bodnar, R.J., and Taylor, L.A. (2014) Two-stage polybaric formation of the new enriched, pyroxene-oikocrystic, lherzolitic shergottite, NWA 7397. Meteoritics & Planetary Science, 49(10), 1812-1830.
27. Hu, S., Feng, L., and Lin, Y. (2011) Petrography, mineral chemistry and shock metamorphism of Yamato 984028 lherzolitic shergottite. Chinese Science Bulletin, 56(15), 1579-1587.
28. Ikeda, Y. (1997) Petrology and mineralogy of the Y-793605 Martian meteorite. Antarctic Meteorite Research, 10, 1340
29. Ikeda, Y. (1998) Petrology of magmatic silicate inclusions in the Allan Hills 77005 lherzolitic shergottite. Meteoritics & Planetary Science, 33(4), 803-812.
30. Ikeda, Y. (2004) Petrology of the Yamato 980459 shergottite. Antarctic meteorite research, 17, 35-54
31. Imae, N., and Ikeda, Y. (2007) Petrology of the Miller Range 03346 nakhlite in comparison with the Yamato-000593 nakhlite. Meteoritics & Planetary Science
32. Jambon, A., Barrat, J.A., Sautter, V., Gillet, P., Göpel, C., Javoy, M., Joron, J.L., and Lesourd, M. (2002) The basaltic shergottite Northwest Africa 856: Petrology and chemistry. Meteoritics & Planetary Science, 37(9), 1147-1164.
33. Jiang, Y., and Hsu, W. (2012) Petrogenesis of Grove Mountains 020090: An enriched "lherzolitic" shergottite. Meteoritics & Planetary Science, 47(9), 1419-1435.
34. Johnson, M.C., Rutherford, M.J., and Hess, P.C. (1991) Chassigny petrogenesis: Melt compositions, intensive parameters and water contents of Martian (?) magmas. Geochimica et Cosmochimica Acta, 55(1), 349-366.
35. Kring, D.A., Gleason, J.D., Swindle, T.D., Nishiizumi, K., Caffee, M.W., Hill, D.H., Jull, A.J., and Boynton, W.V. (2003) Composition of the first bulk melt sample from a volcanic region of Mars: Queen Alexandra Range 94201. Meteoritics & Planetary Science, 38(12), 1833-1848.
36. Lin, Y., Guan, Y., Wang, D., Kimura, M., and Leshin, L.A. (2005) Petrogenesis of the new lherzolitic shergottite Grove Mountains 99027: Constraints of petrography, mineral chemistry, and rare earth elements. Meteoritics & Planetary Science, 40(11), 1599-1619.
37. Lin, Y., Hu, S., Miao, B., Xu, L., Liu, Y., Xie, L., Feng, L., and Yang, J. (2013) Grove Mountains 020090 enriched lherzolitic shergottite: A two-stage formation model. Meteoritics & Planetary Science, 48(9), 1572-1589.
38. McCoy, T.J., Wadhwa, M., and Keil, K. (1999) New lithologies in the Zagami meteorite: Evidence for fractional crystallization of a single magma unit on Mars. Geochimica et Cosmochimica Acta, 63(7), 1249-1262.
39. McSween, H.Y., and Jarosewich, E. (1983) Petrogenesis of the Elephant Moraine A79001 meteorite: Multiple magma pulses on the shergottite parent body. Geochimica et Cosmochimica Acta, 47(8), 1501-1513.
40. McSween, H.Y., and Treiman, A.H. (1998) Martian meteorites. Reviews in Mineralogy and Geochemistry, 36(1), 6-1.

41. Mcsween, H.Y., Eisenhour, D.D., Taylor, L.A., Wadhwa, M., and Crozaz, G. (1996) QUE94201 shergottite: Crystallization of a Martian basaltic magma. Geochimica et Cosmochimica Acta, 60(22), 4563-4569.
42. Mikouchi, T., and Miyamoto, M. (2002) Mineralogy and olivine cooling rate of the Dhofar 019 shergottite. Antarctic meteorite research, 15, 122-142.
43. Mikouchi, T. (2001) Mineralogical similarities and differences between the Los Angeles basaltic shergottite and the Asuka-881757 lunar mare meteorite. Antarctic meteorite research, 14, 1-20.
44. Mikouchi, T. (2005) Northwest Africa 1950: Mineralogy and comparison with Antarctic lherzolitic shergottites. Meteoritics & Planetary Science, 40(11), 1621-1634.
45. MIKOUCHI, T., MIYAMOTO, M., and McKAY, G.A. (1998) Mineralogy of Antarctic basaltic shergottite Queen Alexandra Range 94201: similarities to Elephant Moraine A79001 (lithology B) martian meteorite. Meteoritics & Planetary Science, 33(2), 181-189.
46. Mittlefehldt, D.W. (1994) ALH84001, a cumulate orthopyroxenite member of the Martian meteorite clan. Meteoritics & Planetary Science, 29(2), 214-221.
47. Nagao, K., Nakamura, T., Miura, Y.N., and Takaoka, N. (1997) Noble gases and mineralogy of primary igneous materials of the Yamato-793605 shergottite. Antarctic meteorite research, 10, 125-142.
48. Peslier, A.H., Hnatyshin, D., Herd, C.D.K., Walton, E.L., Brandon, A.D., Lapen, T.J., and Shafer, J.T. (2010) Crystallization, melt inclusion, and redox history of a Martian meteorite: Olivine-phyric shergottite Larkman Nunatak 06319. Geochimica et Cosmochimica Acta, 74(15), 4543-4576.
49. Santos, A.R., Agee, C.B., McCubbin, F.M., Shearer, C.K., Burger, P.V., Tartese, R., and Anand, M. (2015) Petrology of igneous clasts in Northwest Africa 7034: Implications for the petrologic diversity of the Martian crust. Geochimica et Cosmochimica Acta, 157, 56-85.
50. Sarbadhikari, A.B., Day, J.M., Liu, Y., Rumble, D., and Taylor, L.A. (2009) Petrogenesis of olivine-phyric shergottite Larkman Nunatak 06319: Implications for enriched components in Martian basalts. Geochimica et Cosmochimica Acta, 73(7), 2190-2214.
51. Sautter, V., Barrat, J.A., Jambon, A., Lorand, J.P., Gillet, P., Javoy, M., Joron, J.L., and Lesourd, M. (2002) A new Martian meteorite from Morocco: the nakhlite North West Africa 817. Earth and Planetary Science Letters (195(3), 223-238.
52. Shearer, C.K., Leshin, L.A., and Adcock, C.T. (1999) Olivine in Martian meteorite Allan Hills 84001: Evidence for a high-temperature origin and implications for signs of life. Meteoritics & Planetary Science, 34(3), 331-339.
53. Steele, Ian M., and Joseph V. Smith. (1982) Petrography and mineralogy of two basalts and olivine-pyroxene-spinel fragments in achondrite EETA79001. Journal of Geophysical Research: Solid Earth 87, A375-A384.
54. Szymanski, A., Brenker, F.E., Palme, H., and El Goresy, A. (2010) High oxidation state during formation of Martian nakhlites. Meteoritics & Planetary Science, 45(1), 21-31.

55. Taylor, L.A., Nazarov, M.A., Shearer, C.K., McSween, H.Y., Cahill, J., Neal, C.R., Ivanova, M.A., Barsukova, L.D., Lentz, R.C., Clayton, R.N., and Mayeda, T.K. (2002) Martian meteorite Dhofar 019: A new shergottite. Meteoritics & Planetary Science, 37(8), 1107-1128.
56. Treiman, A.H., Dyar, M.D., McCanta, M., Noble, S.K., and Pieters, C.M. (2007) Martian Dunite NWA 2737: Petrographic constraints on geological history, shock events, and olivine color. Journal of Geophysical Research: Planets, 112(E4).
57. Treiman, A.H., McKay, G.A., Bogard, D.D., Mittlefehldt, D.W., Wang, M.S., Keller, L., Lipschutz, M.E., Lindstrom, M.M., and Garrison, D. (1994) Comparison of the LEW88516 and ALHA77005 martian meteorites: Similar but distinct. Meteoritics & Planetary Science, 29(5), 581-592.
58. Udry, A., McSWEEN Jr, H.Y., LECUMBERRI-SANCHEZ, P., and Bodnar, R.J. (2012) Paired nakhlites MIL 090030, 090032, 090136, and 03346: Insights into the Miller Range parent meteorite. Meteoritics & Planetary Science, 47(10), 1575-1589.
59. Usui, T., McSween, H.Y., and Floss, C. (2008) Petrogenesis of olivine-phyric shergottite Yamato 980459, revisited. Geochimica et Cosmochimica Acta, 72(6), 1711-1730.
60. Wadhwa, M., Lentz, R.C.F., McSween, H.Y., and Crozaz, G. (2001) A petrologic and trace element study of Dar al Gani 476 and Dar al Gani 489: Twin meteorites with affinities to basaltic and lherzolitic shergottites. Meteoritics & Planetary Science, 36(2), 195-208.
61. Warren, P.H., Greenwood, J.P., and Rubin, A.E. (2004) Los Angeles: A tale of two stones. Meteoritics & Planetary Science, 39(1), 137-156.
62. Wittmann, A., Korotev, R.L., Jolliff, B.L., Irving, A.J., Moser, D.E., Barker, I., and Rumble, D. (2015) Petrography and composition of Martian regolith breccia meteorite Northwest Africa 7475. Meteoritics & Planetary Science, 50(2), 326-352.
63. Yukio, I., Makoto, K., Hiroshi, T., Gen, S., Kita, N., Yuichi, M., Akio, S., Emil, J., and Gerlind, D. (2006) Petrology of a new basaltic shergottite: Dhofar 378. Antarctic Meteorite Research, 19 (20-44.
64. Zipfel, J., Scherer, P., Spettel, B., Dreibus, G., and Schultz, L. (2000) Petrology and chemistry of the new shergottite Dar al Gani 476. Meteoritics & Planetary Science, 35(1), 95-106.