

List of references in alphabetical order excluding MetPetDB & Earthchem:

1. Alizai et al. (2016)
2. Altunbey and Kiliç, (2019)
3. Antao (2013)
4. Antao and Cruickshank (2018)
5. Antao and Round (2014)
6. Armbruster et al. (1998)
7. Beard and Drake (2007)
8. Bell et al. (1995)
9. Bónová et al. (2018)
10. Bulanova et al., 2010
11. Bulanova, Unpub
12. Capetown, Unpubl
13. Cenko-Tok and Chopin (2006)
14. Chasse
15. Chen et al. (1996)
16. Chen et al. (2004)
17. Chen et al. (2015)
18. Dasgupta et al. (1987)
19. Davies et al., 1999
20. Davies et al., 2004B
21. Deer, Howie, and Zussman (1982)
22. Dzigbodi-Adjimah (2004)
23. EarthChem
24. Enami et al. (1993)
25. Exley (1982)
26. Fedorowich et al. (1993)
27. Gadas et al. (2012)
28. Galuskina et al. (2010)
29. Galuskina et al. (2010)
30. Gaspar et al. (2008)
31. Gatewood et al., 2015
32. Ghosh and Morishita (2011)
33. Ghosh et al. (2017)
34. Gurney and Moore, 1986
35. Harangi et al. (2001)
36. Harte and Cayzer, 2007
37. Haynes et al. (2003)
38. Hilton (2000)
39. Hode Vuorinen et al. (2005)
40. Huang et al. (2020)
41. Hutchison, 1997
42. Inglis et al. (2017)
43. Ivanova et al., 2017
44. Jamtveit et al. (1997)
45. Javanmard et al. (2018)
46. Jeong and Kim (1999)
47. Kaminsky et al., 2001
48. Katerinopoulou (2009)
49. Kawakami et al. (2019)
50. Kebede, Koeberl, and Koller (2001)

51. Korinevsky (2015)
52. Kotkova and Harley (2010)
53. Krippner et al. (2016)
54. Li et al. (2018)
55. Locock (2008)
56. Makrygina and Suvorova (2011)
57. Manton et al. (2017)
58. Marks et al. (2008)
59. Mason (1966)
60. Mcaloon and Hofmeister (1995)
61. MetPetDB
62. Meyer and Mahin, 1986
63. Meyer and Svisero, 1975
64. Moore and Gurney, 1985
65. Moore and Gurney., 1989
66. Moore et al., 1991
67. Mueller and Delor (1991)
68. Munno et al. (1980)
69. Naimo et al. (2002)
70. Naimo et al. (2003)
71. Nixon et al. (1963)
72. Padovani and Tracy (1981)
73. Pal and Das (2010)
74. Parthasarathy et al. (1999)
75. Patranabis-Deb, Schieber, and Basu (2008)
76. Philpotts et al. (1972)
77. Plümper et al. (2014)
78. Pokhilenko et al., 2004
79. Preston et al. (2001)
80. Pribavkin, Avdonina, and Zamyatin (2012)
81. Quartieri et al. (2002)
82. RRUFF
83. Russell et al. (1999)
84. Salnikova et al. (2019)
85. Schertl et al. (2018)
86. Schingaro et al. (2001)
87. Schingaro et al. (2016)
88. Schöning et al. (2018)
89. Sibi and Subodh (2017)
90. Sieck et al. (2019)
91. Sipahi et al. (2017)
92. Sobolev et al. (2011)
93. Sobolev et al., 1997
94. Sobolev et al., 2004
95. Song et al. (2003)
96. Stachel and Harris, 1997
97. Stachel et al., 1998
98. Stachel et al., 2000
99. Stähle et al., 2011
100. Stalder and Rozendaal (2005)
101. Suwa et al. (1996)

102. Tappert et al., 2005B
103. Taran and Langer (2000)
104. Thomson et al. (2016)
105. Thomson, Unpub
106. Tian et al. (2019)
107. Tsai et al., 1979
108. Volkova et al. (2014)
109. Von Knorring et al. (1986)
110. Wang et al. (1999)
111. Wang et al., 2000
112. Wang, Essene, and Zhang (2000)
113. Weiss (1949)
114. Wilding, 1990
115. Yang et al. (2013)
116. Zedgenizov et al., 2014
117. Zeh and Gerdes (2014)
118. Zhang et al. (2022)
119. Zhou et al. (2017)

(Weiss, 1949; Nixon et al., 1963; Mason, 1966; Gurney and Moore, 1986; Fedorowich et al., 1995; Bell et al., 1995; Wang et al., 2000, 2000; Preston et al., 2002; Song et al., 2003; Galuskina et al., 2010a, 2010b; Sobolev et al., 2011; Krippner et al., 2016; Sipahi, Ferkan et al., 2017; Li et al., 2018a; Bonova et al., 2018; Kawakami et al., 2019; Salnikova et al., 2019; Tian et al., 2019)(Deer et al., 2013)
 (Davies et al., 2004)(Philpotts et al., 1972; Wilding, 1990; Hutchison, 1997; Stachel et al., 1998; Stachel, T. et al., 2000; Kaminsky et al., 2001; Sobolev et al., 2004; Bulanova et al., 2010; Huang et al., 2020; Zhang et al., 2022)
 (Cenki-Tok and Chopin, 2006; Antao and Round, 2014)(Antao and Cruickshank, 2018)(Reinecke et al., 1985; Yang et al., 2013; Chen et al., 2015; Rahmani Javanmard et al., 2018)
 (Alizai et al., 2016; Zhou et al., 2017)(Exley, 1982; Armbruster, 1998; Russell et al., 1999; Hilton, 2000; Taran and Langer, 2000; Quartieri et al., 2002; Naimo et al., 2003; Dzigbodi-Adjimah, 2004; Hode Vuorinen et al., 2005; Marks et al., 2008; Katerinopoulou, 2009; Makrygina and Suvorova, 2011; Antao, 2013; Plümper et al., 2014; Korinevsky, 2015; Ghosh et al., 2017; Li et al., 2018a; Schönig et al., 2018)
 (Munno et al., 1980; von Knorring et al., 1986; Dasgupta et al., 1987; Mueller and Delor, 1991; Enami et al., 1993; McAloon and Hofmeister, 1995; Chen et al., 1996, 2004; Suwa et al., 1996; Jamtveit et al., 1997; Jeong and Kim, 1999; Wang et al., 1999; Parthasarathy et al., 1999; Schingaro et al., 2001; Harangi, 2001; Haynes et al., 2003; Naimo et al., 2003; Walter et al., 2004; Stalder and Rozendaal, 2005; Beard and Drake, 2007; Gaspar et al., 2008; Locock, 2008; Pal and Das, 2010; Kotková and Harley, 2010; Ghosh and Morishita, 2011; Zeh and Gerdes, 2014; Schingaro, 2016; Thomson et al., 2016; Schertl et al., 2018)(Ivanova et al., 2017; Altunbey and Kiliç, 2019)(Chassé et al., 2018)

(Padovani and Tracy, 1981; Fujimaki et al., 1984; Kebede et al., 2001; Patranabis-Deb et al., 2009; Pribavkin et al., 2013; Gadas et al., 2013; Plümper et al., 2014; Inglis et al., 2017; Manton et al., 2017; Sibi and Subodh, 2017; Li et al., 2018b; Sieck et al., 2019)(Stähle et al., 2011; Zedgenizov et al., 2014; Volkova et al., 2014; Sipahi et al., 2017)

References

- Alizai, A., Clift, P.D., and Still, J., 2016, Indus Basin sediment provenance constrained using garnet geochemistry: *Journal of Asian Earth Sciences*, v. 126, p. 29–57, doi:10.1016/j.jseaes.2016.05.023.
- Altunbey, M., and Kiliç, A.D., 2019, Fluid inclusion and oxygen isotope studies in garnets related to Çavuşlu Skarn iron mineralization, East Turkey: *Journal of African Earth Sciences*, v. 149, p. 465–473, doi:10.1016/j.jafrearsci.2018.09.004.
- Antao, S.M., 2013, Three cubic phases intergrown in a birefringent andradite-grossular garnet and their implications: *Physics and Chemistry of Minerals*, v. 40, p. 705–716, doi:10.1007/s00269-013-0606-4.
- Antao, S.M., and Cruickshank, L.A., 2018, Crystal structure refinements of tetragonal (OH,F)-rich spessartine and henritermierite garnets: *Acta Crystallographica Section B Structural Science, Crystal Engineering and Materials*, v. 74, p. 104–114, doi:10.1107/S2052520617018248.
- Antao, S.M., and Round, S.A., 2014, Crystal chemistry of birefringent spessartine: *Powder Diffraction*, v. 29, p. 233–240, doi:10.1017/S0885715614000062.
- Armbruster, 1998, Crystal chemistry of Ti-bearing andradites: *European Journal of Mineralogy*, v. 10, p. 907–922, doi:10.1127/ejm/10/5/0907.
- Barbosa, E.S.R., Brod, J.A., Junqueira-Brod, T.C., Dantas, E.L., Cordeiro, P.F. de O., and Gomide, C.S., 2012, Bebedourite from its type area (Salitre I complex): A key petrogenetic series in the Late-Cretaceous Alto Paranaíba kamafugite–carbonatite–phoscorite association, Central Brazil: *Lithos*, v. 144–145, p. 56–72, doi:10.1016/j.lithos.2012.04.013.
- Beard, D., and Drake, M., 2007, A melilite-bearing high-temperature calcic skarn ...: mafiadoc.com, https://mafiadoc.com/a-melilite-bearing-high-temperature-calcic-skarn-_5baa1c57097c47c5688b461c.html (accessed February 2019).
- Bell, D.R., Ihinger, P.D., and Rossman, G.R., 1995, Quantitative analysis of trace OH in garnet and pyroxenes: *American Mineralogist*, v. 80, p. 465–474, doi:10.2138/am-1995-5-607.
- Bonova, K., Mikuš, T., and Bóna, J., 2018, Is Cr-Spinel Geochemistry Enough for Solving the Provenance Dilemma? Case Study from the Palaeogene Sandstones of the Western Carpathians (Eastern Slovakia): *Minerals*, v. 8, p. 543, doi:10.3390/min8120543.
- Bulanova, G., Walter, M., Smith, C., Kohn, S., Armstrong, L., Blundy, J., and Gobbo, L., 2010, Mineral inclusions in sublithospheric diamonds from Collier 4 kimberlite pipe, Juina, Brazil: Subducted protoliths, carbonated melts and primary kimberlite magmatism: *Contributions to Mineralogy and Petrology*, v. 160, p. 489–510, doi:10.1007/s00410-010-0490-6.
- Cenki-Tok, B., and Chopin, C., 2006, Coexisting calderite and spessartine garnets in eclogite-facies metacherts of the Western Alps: *Mineralogy and Petrology*, v. 88, p. 47–68, doi:10.1007/s00710-006-0146-4.

- Chassé, M., Griffin, W.L., Alard, O., O'Reilly, S.Y., and Calas, G., 2018, Insights into the mantle geochemistry of scandium from a meta-analysis of garnet data: *Lithos*, v. 310–311, p. 409–421, doi:10.1016/j.lithos.2018.03.026.
- Chen, M., Sharp, T.G., El Goresy, A., Wopenka, B., and Xie, X., 1996, The Majorite-Pyropite + Magnesio-wüstite Assemblage: Constraints on the History of Shock Veins in Chondrites: *Science*, v. 271, p. 1570–1573, doi:10.1126/science.271.5255.1570.
- Chen, M., Xie, X., and Goresy, A.E., 2004, A shock-produced (Mg, Fe)SiO₃ glass in the Suizhou meteorite: *Meteoritics & Planetary Science*, v. 39, p. 1797–1808, doi:10.1111/j.1945-5100.2004.tb00076.x.
- Chen, Y.-X., Zhou, K., Zheng, Y.-F., Chen, R.-X., and Hu, Z., 2015, Garnet geochemistry records the action of metamorphic fluids in ultrahigh-pressure dioritic gneiss from the Sulu orogen: *Chemical Geology*, v. 398, p. 46–60, doi:10.1016/j.chemgeo.2015.01.021.
- Chiama, K., Gabor, M., Rutledge, R., Lupini, I., Nord, J. A., Zhang, S., Boujibar, A., Spear, F., Morrison, S. M., Hazen, R. M., 2021, Garnet mineral geochemistry data download from the MetPetDB (re3data.org), August 2019, Version 1.0. Interdisciplinary Earth Data Alliance (IEDA). <https://doi.org/10.26022/IEDA/112173>. Accessed 2021-10-29.
- Chiama, K., Gabor, M., Nord, J. A., Lupini, I., Boujibar, A., Morrison, S. M., Lehnert, K., Rutledge, R., Zhang, S., Hazen, R. M., 2021, Garnet mineral geochemistry data download from the EarthChem Portal, August 2019, Version 1.0. Interdisciplinary Earth Data Alliance (IEDA). <https://doi.org/10.26022/IEDA/112171>. Accessed 2021-10-27.
- Dasgupta, S., Bhattacharya, P.K., Banerjee, H., Fukuoka, M., Majumdar, N., and Roy, S., 1987, Calderite-rich garnets from metamorphosed manganese silicate rocks of the Sausar Group, India, and their derivation: *Mineralogical Magazine*, v. 51, p. 577–583, doi:10.1180/minmag.1987.051.362.12.
- Davies, R.M., Griffin, W.L., O'Reilly, S.Y., and McCandless, T.E., 2004, Inclusions in diamonds from the K14 and K10 kimberlites, Buffalo Hills, Alberta, Canada: diamond growth in a plume? *Lithos*, v. 77, p. 99–111, doi:10.1016/j.lithos.2004.04.008.
- Deer, W.A., FRS, Howie, R.A., and Zussman, J., 2013, *An Introduction to the Rock-Forming Minerals*: Mineralogical Society of Great Britain and Ireland, doi:10.1180/DHZ.
- Dzigbodi-Adjimah, K., 2004, The mineralogy and petrography of the ferruginous manganese rocks at Mankwadzi, Ghana: *Journal of African Earth Sciences*, v. 38, p. 293–315, doi:10.1016/j.jafrearsci.2003.08.001.
- Enami, M., Zhao, Z., and Wang, Q., 1993, A calderitic garnet paragenesis in granitic gneisses in the Su-Lu ultra high-pressure terrane, eastern China: *Mineralogical Journal*, v. 16, p. 268–277, doi:10.2465/minerj.16.268.
- Exley, R.A., 1982, Electron microprobe studies of Iceland Research Drilling Project high-temperature hydrothermal mineral geochemistry: *Journal of Geophysical Research: Solid Earth*, v. 87, p. 6547–6557, doi:10.1029/JB087iB08p06547.

- Fedorowich, J.S., Jain, J.C., Kerrich, R., and Sopuck, V., 1995, Trace-element analysis of garnet by laser-ablation microprobe ICP-MS.
- Fujimaki, H., Tatsumoto, M., and Aoki, K., 1984, Partition coefficients of Hf, Zr, and ree between phenocrysts and groundmasses: *Journal of Geophysical Research: Solid Earth*, v. 89, p. B662–B672, doi:10.1029/JB089iS02p0B662.
- Gadas, P., Novák, M., Talla, D., and Vašinová Galiová, M., 2013, Compositional evolution of grossular garnet from leucotonalitic pegmatite at Ruda nad Moravou, Czech Republic; a complex EMPA, LA-ICP-MS, IR and CL study: *Mineralogy & Petrology*, v. 107, p. 311–326, doi:10.1007/s00710-012-0232-8.
- Galuskina, I.O. et al., 2010a, Bitikleite-(SnAl) and bitikleite-(ZrFe): New garnets from xenoliths of the Upper Chegem volcanic structure, Kabardino-Balkaria, Northern Caucasus, Russia: *American Mineralogist*, v. 95, p. 959–967, doi:10.2138/am.2010.3458.
- Galuskina, I.O. et al., 2010b, Elbrusite-(Zr)—A new uranian garnet from the Upper Chegem caldera, Kabardino-Balkaria, Northern Caucasus, Russia: *American Mineralogist*, v. 95, p. 1172–1181, doi:10.2138/am.2010.3507.
- Gaspar, M., Knaack, C., Meinert, L.D., and Moretti, R., 2008, REE in skarn systems: A LA-ICP-MS study of garnets from the Crown Jewel gold deposit: *Geochimica et Cosmochimica Acta*, v. 72, p. 185–205, doi:10.1016/j.gca.2007.09.033.
- Gatewood, M.P., Dragovic, B., Stowell, H.H., Baxter, E.F., Hirsch, D.M., and Bloom, R., 2015, Evaluating chemical equilibrium in metamorphic rocks using major element and Sm–Nd isotopic age zoning in garnet, Townshend Dam, Vermont, USA: *Chemical Geology*, v. 401, p. 151–168, doi:10.1016/j.chemgeo.2015.02.017.
- Ghosh, B., and Morishita, T., 2011, ANDRADITE–UVAROVITE SOLID SOLUTION FROM HYDROTHERMALLY ALTERED PODIFORM CHROMITITE, RUTLAND OPHIOLITE, ANDAMAN, INDIA: *The Canadian Mineralogist*, v. 49, p. 573–580, doi:10.3749/canmin.49.2.573.
- Ghosh, B., Morishita, T., Ray, J., Tamura, A., Mizukami, T., Soda, Y., and Ovung, T.N., 2017, A new occurrence of titanian (hydro)andradite from the Nagaland ophiolite, India: Implications for element mobility in hydrothermal environments: *Chemical Geology*, v. 457, p. 47–60, doi:10.1016/j.chemgeo.2017.03.012.
- Gurney, J., and Moore, R.O., 1986, Mineral Inclusions in Diamonds From the Monastery Kimberlite, South Africa, *in* v. 14.
- Harangi, 2001, Almandine Garnet in Calc-alkaline Volcanic Rocks of the Northern Pannonian Basin (Eastern–Central Europe): Geochemistry, Petrogenesis and Geodynamic Implications: *Journal of Petrology*, v. 42, p. 1813–1843, doi:10.1093/petrology/42.10.1813.
- Haynes, E.A., Moecher, D.P., and Spicuzza, M.J., 2003, Oxygen isotope composition of carbonates, silicates, and oxides in selected carbonatites: constraints on crystallization temperatures of carbonatite magmas: *Chemical Geology*, v. 193, p. 43–57, doi:10.1016/S0009-2541(02)00244-9.

- Hilton, E., 2000, Composition and structure of titanian andradite from magmatic and hydrothermal environments: University of British Columbia, doi:10.14288/1.0089519.
- Hode Vuorinen, J., Hålenius, U., Whitehouse, M.J., Mansfeld, J., and Skelton, A.D.L., 2005, Compositional variations (major and trace elements) of clinopyroxene and Ti-andradite from pyroxenite, ijolite and nepheline syenite, Alnö Island, Sweden: *Lithos*, v. 81, p. 55–77, doi:10.1016/j.lithos.2004.09.021.
- Huang, G., Guo, J., Cui, W., and Palin, R., 2020, Deciphering garnet genesis in meta-igneous rocks: An example from the Jiao-Liao-Ji Belt, North China Craton: *Precambrian Research*, v. 348, p. 105871, doi:10.1016/j.precamres.2020.105871.
- Hutchison, M.T., 1997, Constitution of the deep transition zone and lower mantle shown by diamonds and their inclusions: , p. 856.
- Inglis, J.D., Hefferan, K., Samson, S.D., Admou, H., and Saquaque, A., 2017, Determining age of Pan African metamorphism using Sm-Nd garnet-whole rock geochronology and phase equilibria modeling in the Tasriwine ophiolite, Sirwa, Anti-Atlas Morocco: *Journal of African Earth Sciences*, v. 127, p. 88–98, doi:10.1016/j.jafrearsci.2016.06.021.
- Ivanova, O.A., Logvinova, A.M., and Pokhilenko, N.P., 2017, Inclusions in diamonds from Snap Lake kimberlites (Slave Craton, Canada): Geochemical features of crystallization: *Doklady Earth Sciences*; Dordrecht, v. 474, p. 490–493, doi:http://dx.doi.org.mutex.gmu.edu/10.1134/S1028334X17050129.
- Jamtveit, B., Dahlgren, S., and Austrheim, H., 1997, High-grade contact metamorphism of calcareous rocks from the Oslo Rift, Southern Norway: *American Mineralogist*, v. 82, p. 1241–1254, doi:10.2138/am-1997-11-1219.
- Jeong, G.Y., and Kim, Y.H., 1999, Goldmanite from the black slates of the Ogcheon belt, Korea: *Mineralogical Magazine*, v. 63, p. 253–256, doi:10.1180/002646199548358.
- Kaminsky, F., Zakharchenko, O.D., Davies, R., Griffin, W., Khachatryan-Blinova, G.K., and Shiryaev, A., 2001, Superdeep diamonds from the Juina area, Mato Grosso State, Brazil: *Contributions to Mineralogy and Petrology*, v. 140, p. 734–753, doi:10.1007/s004100000221.
- Katerinopoulou, 2009, A multi-analytical study of the crystal structure of unusual Ti–Zr–Cr-rich Andradite from the Maronia skarn, Rhodope massif, western Thrace, Greece: *Mineralogy and Petrology*, v. 95, p. 113–124, doi:10.1007/s00710-008-0023-4.
- Kawakami, T., Horie, K., Hokada, T., Hattori, K., and Hirata, T., 2019, Disequilibrium REE compositions of garnet and zircon in migmatites reflecting different growth timings during single metamorphism (Aoyama area, Ryoke belt, Japan): *Lithos*, v. 338–339, p. 189–203, doi:10.1016/j.lithos.2019.04.021.
- Kebede, T., Koeberl, C., and Koller, F., 2001, Magmatic evolution of the suqii-wagga garnet-bearing two-mica granite, wallagga area, western Ethiopia: *Journal of African Earth Sciences*, v. 32, p. 193–221, doi:10.1016/S0899-5362(01)90004-1.

- von Knorring, O., Condcliffe, E., and Tong, Y.L., 1986, Some mineralogical and geochemical aspects of chromium-bearing skarn minerals from northern Karelia, Finland: *Bulletin of the Geological Society of Finland*, v. 58, p. 277–292, doi:10.17741/bgsf/58.1.019.
- Korinevsky, V.G., 2015, Spessartine-Andradite In Scapolite Pegmatite, Ilmeny Mountains, Russia: *The Canadian Mineralogist*, v. 53, p. 623–632, doi:10.3749/canmin.4354.
- Kotková, J., and Harley, S.L., 2010, Anatexis during High-pressure Crustal Metamorphism: Evidence from Garnet–Whole-rock REE Relationships and Zircon–Rutile Ti–Zr Thermometry in Leucogranulites from the Bohemian Massif: *Journal of Petrology*, v. 51, p. 1967–2001, doi:10.1093/petrology/egq045.
- Kozror Solution properties of almandine-pyropegarnet as determined by phase equilibrium experiments:
- Krippner, A., Meinhold, G., Morton, A.C., Schöning, J., and von Eynatten, H., 2016, Heavy minerals and garnet geochemistry of stream sediments and bedrocks from the Almklovdalen area, Western Gneiss Region, SW Norway: Implications for provenance analysis: *Sedimentary Geology*, v. 336, p. 96–105, doi:10.1016/j.sedgeo.2015.09.009.
- Lehnert, K., Su, Y., Langmuir, C., Sarbas, B., and Nohl, U., 2000, A global geochemical database structure for rocks, *Geochemistry Geophysics Geosystems*, 1, <http://dx.doi.org/10.1029/1999GC000026>.
- Li, D., Fu, Y., and Sun, X., 2018a, Onset and duration of Zn–Pb mineralization in the Talate Pb–Zn (—Fe) skarn deposit, NW China: Constraints from spessartine U–Pb dating: *Gondwana Research*, v. 63, p. 117–128, doi:10.1016/j.gr.2018.05.013.
- Li, X., Song, S., Zhang, L., and Höfer, E.H., 2018b, Application of microprobe-based flank method analysis of Fe³⁺ in garnet of North Qilian eclogite and its geological implication: *Science Bulletin*, v. 63, p. 300–305, doi:10.1016/j.scib.2018.01.025.
- Locock, A.J., 2008, An Excel spreadsheet to recast analyses of garnet into end-member components, and a synopsis of the crystal chemistry of natural silicate garnets: *Computers & Geosciences*, v. 34, p. 1769–1780, doi:10.1016/j.cageo.2007.12.013.
- Major and trace elements in pyrope–almandine garnets as sediment provenance indicators of the Lower Carboniferous Culm sediments, Drahaný Uplands, Bohemian Massif, 2005, *Lithos*, v. 82, p. 51–70, doi:10.1016/j.lithos.2004.12.006.
- Makrygina, V.A., and Suvorova, L.F., 2011, Spessartine in the greenschist facies: Crystallization conditions: *Geochemistry International*, v. 49, p. 299–308, doi:10.1134/S0016702911030074.
- Manton, R.J., Buckman, S., Nutman, A.P., Bennett, V.C., and Belousova, E.A., 2017, U–Pb–Hf–REE–Ti zircon and REE garnet geochemistry of the Cambrian Attunga eclogite, New England Orogen, Australia: Implications for continental growth along eastern Gondwana: *Orogens and Oceanic Terranes: Tectonics*, v. 36, p. 1580–1613, doi:10.1002/2016TC004408.
- Marks, M.A.W., Coulson, I.M., Schilling, J., Jacob, D.E., Schmitt, A.K., and Markl, G., 2008, The effect of titanite and other HFSE-rich mineral (Ti-bearing andradite, zircon, eudialyte) fractionation on the geochemical evolution of silicate melts: *Chemical Geology*, v. 257, p. 153–172, doi:10.1016/j.chemgeo.2008.09.002.

- Mason, B., 1966, Pyrope, augite, and hornblende from Kakanui, New Zealand: *New Zealand Journal of Geology and Geophysics*, v. 9, p. 474–480, doi:10.1080/00288306.1966.10422491.
- McAloon, B.P., and Hofmeister, A.M., 1995, Single-crystal IR spectroscopy of grossular-andradite garnets: *American Mineralogist*, v. 80, p. 1145–1156, doi:10.2138/am-1995-11-1205.
- Mueller, A.G., and Delor, C.P., 1991, Goldmanite-rich garnet in skarn veins, Southern Cross greenstone belt, Yilgarn Block, Western Australia: *Mineralogical Magazine*, v. 55, p. 617–620, doi:10.1180/minmag.1991.055.381.15.
- Munno, R., Rossi, G., and Tadini, C., 1980, Crystal chemistry of kimzeyite from Stromboli, Aeolian Islands, Italy: *American Mineralogist*, v. 65, p. 188–191.
- Naimo, D., Balassone, G., Beran, A., Amalfitano, C., Imperato, M., and Stanzione, D., 2003, Garnets in volcanic breccias of the Phlegraean Fields (southern Italy): mineralogical, geochemical and genetic features: *Mineralogy and Petrology*, v. 77, p. 259–270, doi:http://dx.doi.org.mutex.gmu.edu/10.1007/s00710-002-0219-y.
- Nixon, P.H., Knorring, O. von, and Rooke, J.M., 1963, Kimberlites And Associated Inclusions Of Basytoland: A Mineralogical And Geochemical Study: *American Mineralogist*, v. 48, p. 1090–1132.
- Padovani, E.R., and Tracy, R.J., 1981, A pyrope-spinel (alkremite) xenolith from Moses Rock Dike: first known North American occurrence: *American Mineralogist*, v. 66, p. 741–745.
- Pal, T., and Das, D., 2010, Uvarovite from chromite-bearing ultramafic intrusives, Orissa, India, a crystal-chemical characterization using ⁵⁷Fe Mössbauer spectroscopy: *American Mineralogist*, v. 95, p. 839–843, doi:10.2138/am.2010.3328.
- Parthasarathy, G., Balaram, V., and Srinivasan, R., 1999, Characterization of green garnets from an Archean calc-silicate rock, Bandihalli, Karnataka, India: evidence for a continuous solid solution between uvarovite and grandite: *Journal of Asian Earth Sciences*, v. 17, p. 345–352, doi:10.1016/S0743-9547(98)00064-6.
- Patranabis-Deb, S., Schieber, J., and Basu, A., 2009, Almandine garnet phenocrysts in a ~1 Ga rhyolitic tuff from central India: *Geological Magazine*, v. 146, p. 133–143, doi:10.1017/S0016756808005293.
- Philpotts, J.A., Schnetzler, C.C., and Thomas, H.H., 1972, Petrogenetic implications of some new geochemical data on eclogitic and ultrabasic inclusions: *Geochimica et Cosmochimica Acta*, v. 36, p. 1131–1166, doi:10.1016/0016-7037(72)90096-8.
- Plümper, O., Beinlich, A., Bach, W., Janots, E., and Austrheim, H., 2014, Garnets within geode-like serpentinite veins: Implications for element transport, hydrogen production and life-supporting environment formation: *Geochimica et Cosmochimica Acta*, v. 141, p. 454–471, doi:10.1016/j.gca.2014.07.002.
- Preston, J., Hartley, A., Mange-Rajetzky, M., Hole, M., May, G., Buck, S., and Vaughan, L., 2002, The Provenance of Triassic Continental Sandstones from the Beryl Field, Northern North Sea: Mineralogical, Geochemical, and Sedimentological Constraints: *Journal of Sedimentary Research*, v. 72, p. 18–29, doi:10.1306/042201720018.

- Pribavkin, S.V., Avdonina, I.S., and Zamyatin, D.A., 2013, Mineralogy, conditions of crystallization and melt generation of epidote-bearing porphyries from the Middle Urals, Russian federation: *Mineralogy and Petrology*, v. 107, p. 125–147, doi:10.1007/s00710-012-0226-6.
- Quartieri, S., Boscherini, F., Chaboy, J., Dalconi, M.C., Oberti, R., and Zanetti, A., 2002, Characterization of trace Nd and Ce site preference and coordination in natural melanites: a combined X-ray diffraction and high-energy XAFS study: *Physics and Chemistry of Minerals*, v. 29, p. 495–502, doi:10.1007/s00269-002-0251-9.
- Rahmani Javanmard, S., Tahmasbi, Z., Ding, X., Ahmadi Khalaji, A., and Hetherington, C.J., 2018, Geochemistry of garnet in pegmatites from the Boroujerd Intrusive Complex, Sanandaj-Sirjan Zone, western Iran: implications for the origin of pegmatite melts: *Mineralogy and Petrology*, v. 112, p. 837–856, doi:10.1007/s00710-018-0591-x.
- Reinecke, T., Okrusch, M., and Richter, P., 1985, Geochemistry of ferromanganoan metasediments from the Island of Andros, Cycladic Blueschist Belt, Greece: *Chemical Geology*, v. 53, p. 249–278, doi:10.1016/0009-2541(85)90074-9.
- Russell, J.K., Dipple, G.M., Lang, J.R., and Lueck, B., 1999, Major-element discrimination of titanian andradite from magmatic and hydrothermal environments: an example from the Canadian Cordillera: *European Journal of Mineralogy*, v. 11, p. 919–936, doi:10.1127/ejm/11/6/0919.
- Sajeev, K., Windley, B.F., Connolly, J.A.D., and Kon, Y., 2009, Retrogressed eclogite (20kbar, 1020°C) from the Neoproterozoic Palghat–Cauvery suture zone, southern India: *Precambrian Research*, v. 171, p. 23–36, doi:10.1016/j.precamres.2009.03.001.
- Salnikova, E.B., Chakhmouradian, A.R., Stifeeva, M.V., Reguir, E.P., Kotov, A.B., Gritsenko, Y.D., and Nikiforov, A.V., 2019, Calcic garnets as a geochronological and petrogenetic tool applicable to a wide variety of rocks: *Lithos*, v. 338–339, p. 141–154, doi:10.1016/j.lithos.2019.03.032.
- Schertl, H.-P., Polednia, J., Neuser, R.D., and Willner, A.P., 2018, Natural End Member Samples of Pyrope and Grossular: A Cathodoluminescence-Microscopy and -Spectra Case Study: *Journal of Earth Science*, v. 29, p. 989–1004, doi:10.1007/s12583-018-0842-0.
- Schingaro, 2016, Crystal chemistry and light elements analysis of Ti-rich garnets: *American Mineralogist*, v. 101, p. 371–384, doi:10.2138/am-2016-5439.
- Schingaro, E., Scordari, F., Capitanio, F., Parodi, G., Smith, D.C., and Mottana, A., 2001, Crystal chemistry of kimzeyite from Anguillara, Mts. Sabatini, Italy: *European Journal of Mineralogy*, v. 13, p. 749–759, doi:10.1127/0935-1221/2001/0013-0749.
- Schönig, J., Meinhold, G., von Eynatten, H., and Lünsdorf, N.K., 2018, Provenance information recorded by mineral inclusions in detrital garnet: *Sedimentary Geology*, v. 376, p. 32–49, doi:10.1016/j.sedgeo.2018.07.009.
- Sibi, N., and Subodh, G., 2017, Structural and Microstructural Correlations of Physical Properties in Natural Almandine-Pyrope Solid Solution: Al₇₀Py₂₉: *Journal of Electronic Materials*, v. 46, p. 6947–6956, doi:10.1007/s11664-017-5801-5.
- Sieck, P., López-Doncel, R., Dávila-Harris, P., Aguillón-Robles, A., Wemmer, K., and Maury, R.C., 2019, Almandine garnet-bearing rhyolites associated to bimodal volcanism in the Mesa Central of

- Mexico: Geochemical, petrological and geochronological evolution: *Journal of South American Earth Sciences*, v. 92, p. 310–328, doi:10.1016/j.jsames.2019.03.018.
- Sipahi, F., Akpınar, İ., Eker, Ç.S., Kaygusuz, A., Vural, A., and Yılmaz, M., 2017, Formation of the Eğrikar (Gümüşhane) Fe–Cu skarn type mineralization in NE Turkey: U–Pb zircon age, lithogeochemistry, mineral chemistry, fluid inclusion, and O–H–C–S isotopic compositions: *Journal of Geochemical Exploration*, v. 182, p. 32–52, doi:10.1016/j.gexplo.2017.08.006.
- Sipahi, Ferkan, Akpınar, İbrahim, Ekar, Çiğdem Saydam, Kaygusuz, Abdullah, Vural, Alaaddin, and Yılmaz, Meltem, 2017, Formation of the Eğrikar (Gümüşhane) Fe–Cu skarn type mineralization in NE Turkey: U–Pb zircon age, lithogeochemistry, mineral chemistry, fluid inclusion, and O–H–C–S isotopic compositions: ResearchGate, https://www.researchgate.net/publication/318964393_Formation_of_the_Egrikar_Gumushane_Fe-Cu_skarn_type_mineralization_in_NE_Turkey_U-Pb_zircon_age_lithogeochemistry_mineral_chemistry_fluid_inclusion_and_O-H-C-S_isotopic_compositions (accessed March 2019).
- Sobolev, N.V., Logvinova, A.M., Zedgenizov, D.A., Seryotkin, Y.V., Yefimova, E.S., Floss, C., and Taylor, L.A., 2004, Mineral inclusions in microdiamonds and macrodiamonds from kimberlites of Yakutia: a comparative study: *Lithos*, v. 77, p. 225–242, doi:10.1016/j.lithos.2004.04.001.
- Sobolev, N.V., Schertl, H.-P., Valley, J.W., Page, F.Z., Kita, N.T., Spicuzza, M.J., Neuser, R.D., and Logvinova, A.M., 2011, Oxygen isotope variations of garnets and clinopyroxenes in a layered diamondiferous calcsilicate rock from Kokchetav Massif, Kazakhstan: a window into the geochemical nature of deeply subducted UHPM rocks: *Contributions to Mineralogy and Petrology*, v. 162, p. 1079, doi:10.1007/s00410-011-0641-4.
- Song, S., Yang, J., Liou, J.G., Wu, C., Shi, R., and Xu, Z., 2003, Petrology, geochemistry and isotopic ages of eclogites from the Dulan UHPM Terrane, the North Qaidam, NW China: *Lithos*, v. 70, p. 195–211, doi:10.1016/S0024-4937(03)00099-9.
- Stachel, T., Harris, J., and Brey, G., 1998, Rare and unusual mineral inclusions in diamonds from Mwadui, Tanzania: *Contributions to Mineralogy and Petrology*, v. 132, p. 34–47, doi:10.1007/s004100050403.
- Stachel, T., Brey, G.P., and Harris, J.W., 2000, Kankan diamonds (Guinea) I: from the lithosphere down to the transition zone: ResearchGate, doi:http://dx.doi.org/10.1007/s004100000173.
- Stähle, V., Altherr, R., Nasdala, L., and Ludwig, T., 2011, Ca-rich majorite derived from high-temperature melt and thermally stressed hornblende in shock veins of crustal rocks from the Ries impact crater (Germany): *Contributions to Mineralogy and Petrology*; Heidelberg, v. 161, p. 275–291, doi:http://dx.doi.org.mutext.gmu.edu/10.1007/s00410-010-0531-1.
- Stalder, M., and Rozendaal, A., 2005, CALDERITE-RICH GARNET AND FRANKLINITE-RICH SPINEL IN AMPHIBOLITE-FACIES HYDROTHERMAL SEDIMENTS, GAMSBERG Zn-Pb DEPOSIT, NAMAQUA PROVINCE, SOUTH AFRICA: *The Canadian Mineralogist*, v. 43, p. 585–599, doi:10.2113/gscanmin.43.2.585.
- Suwa, K., Suzuki, K., and Agata, T., 1996, Vanadium grossular from the Mozambique metamorphic rocks, south Kenya: *Journal of Southeast Asian Earth Sciences*, v. 14, p. 299–308, doi:10.1016/S0743-9547(96)00066-9.

- Taran, M.N., and Langer, K., 2000, Electronic absorption spectra of Fe³⁺ in andradite and epidote at different temperatures and pressures: *European Journal of Mineralogy*, v. 12, p. 7–15, doi:10.1127/0935-1221/2000/0012-0007.
- Thomson, A.R., Kohn, S.C., Bulanova, G.P., Smith, C.B., Araujo, D., and Walter, M.J., 2016, Trace element composition of silicate inclusions in sub-lithospheric diamonds from the Juina-5 kimberlite: Evidence for diamond growth from slab melts: *Lithos*, v. 265, p. 108–124, doi:10.1016/j.lithos.2016.08.035.
- Tian, Z.-D., Leng, C.-B., Zhang, X.-C., Zafar, T., Zhang, L.-J., Hong, W., and Lai, C.-K., 2019, Chemical composition, genesis and exploration implication of garnet from the Hongshan Cu-Mo skarn deposit, SW China: *Ore Geology Reviews*, v. 112, p. 103016, doi:10.1016/j.oregeorev.2019.103016.
- Volkova, N.I., Kovyazin, S.V., Stupakov, S.I., Simonov, V.A., and Sakiev, K.S., 2014, Trace element distribution in mineral inclusions in zoned garnets from eclogites of the Atbashi Range (South Tianshan): *Geochemistry International*, v. 52, p. 939–961, doi:10.1134/S0016702914090092.
- Walter, M.J., Nakamura, E., Trønnes, R.G., and Frost, D.J., 2004, Experimental constraints on crystallization differentiation in a deep magma ocean: *Geochimica et Cosmochimica Acta*, v. 68, p. 4267–4284, doi:10.1016/j.gca.2004.03.014.
- Wang, L., Essene, E.J., and Zhang, Y., 2000, Direct observation of immiscibility in pyrope-almandine-grossular garnet: *American Mineralogist*, v. 85, p. 41–46, doi:10.2138/am-2000-0106.
- Wang, L., Essene, E.J., and Zhang, Y., 1999, Mineral inclusions in pyrope crystals from Garnet Ridge, Arizona, USA: implications for processes in the upper mantle: *Contributions to Mineralogy and Petrology*, v. 135, p. 164–178, doi:10.1007/s004100050504.
- Weiss, J., 1949, WISSAHICKON SCHIST AT PHILADELPHIA, PENNSYLVANIA: *GSA Bulletin*, v. 60, p. 1689–1726, doi:10.1130/0016-7606(1949)60[1689:WSAPP]2.0.CO;2.
- Wilding, M.C., 1990, A study of diamonds with syngenetic inclusions.
- Yang, J., Peng, J., Hu, R., Bi, X., Zhao, J., Fu, Y., and Shen, N.-P., 2013, Garnet geochemistry of tungsten-mineralized Xihuashan granites in South China: *Lithos*, v. 177, p. 79–90, doi:10.1016/j.lithos.2013.06.008.
- Zedgenizov, D.A., Kagi, H., Shatsky, V.S., and Ragozin, A.L., 2014, Local variations of carbon isotope composition in diamonds from São-Luis (Brazil): Evidence for heterogeneous carbon reservoir in sublithospheric mantle: *Chemical Geology*, v. 363, p. 114–124, doi:10.1016/j.chemgeo.2013.10.033.
- Zeh, A., and Gerdes, A., 2014, HFSE (High Field Strength Elements)-transport and U–Pb–Hf isotope homogenization mediated by Ca-bearing aqueous fluids at 2.04Ga: Constraints from zircon, monazite, and garnet of the Venetia Klippe, Limpopo Belt, South Africa: *Geochimica et Cosmochimica Acta*, v. 138, p. 81–100, doi:10.1016/j.gca.2014.04.015.
- Zhang, X.-Y., Wang, H., and Yan, Q.-H., 2022, Garnet geochemical compositions of the Bailongshan lithium polymetallic deposit in Xinjiang Province: Implications for magmatic-hydrothermal evolution: *Ore Geology Reviews*, v. 150, p. 105178, doi:10.1016/j.oregeorev.2022.105178.

Zhou, J., Feng, C., and Li, D., 2017, Geochemistry of the garnets in the Baiganhu W–Sn orefield, NW China: *Ore Geology Reviews*, v. 82, p. 70–92, doi:10.1016/j.oregeorev.2016.11.019.