

Publications

- [1] C Albers, R Sakrowski, L Libon, G Spiekermann, B Winkler, C Schmidt, L Bayarjargal, V Cerantola, S Chariton, N Giordano, H Gretarsson, J Kaa, H-P Liermann, M Sundermann, N Thiering, M Tolan, M Wilke, and C Sternemann. Fe³⁺-hosting carbon phases in the deep earth. *Physical Review B*, 105, 2022. doi: 10.1103/PhysRevB.105.085155.
- [2] G Aprilis, C Strohm, I Kuppenko, S Linhardt, A Laskin, D Vasiukov, V Cerantola, E Koemets, C McCammon, A Kurnosov, AI Chumakov, N Dubrovinskaia, and L Dubrovinsky. Portable double-sided pulsed laser heating system for time resolved geoscience and materials science applications. *Review of Scientific Instruments*, 2017. doi:10.1063/1.4998985.
- [3] L Bayarjargal, C-J Fruhner, N Schrodt, and B Winkler. CaCO₃ phase diagram studied with Raman spectroscopy at pressures up to 50 GPa and high temperatures and DFT modeling. *Physics of the Earth and Planetary Interiors*, 281:31–45, 2018.
- [4] N Biedermann, S Speziale, B Winkler, HJ Reichmann, M Koch-Müller, and G Heide. High pressure behavior of SrCO₃: an experimental and computational Raman scattering study. *Physics and Chemistry of Minerals*, 44:335–343, 2017.
- [5] N Biedermann, B Winkler, S Speziale, HJ Reichmann, and M Koch-Müller. Single-crystal elasticity of SrCO₃ by Brillouin spectroscopy. *High Pressure Research*, 2017. doi:10.1080/08957959.2017.1289193.
- [6] N Biedermann, E Bykova, W Morgenroth, I Efthimiopoulos, J Mueller, G Spiekermann, K Glazyrin, A Pakhomova, K Appel, and M Wilke. Equation of state and high-pressure phase behaviour of SrCO₃. *European Journal of Mineralogy*, 32, 2020. doi: 10.5194/ejm-32-575-2020.
- [7] J Binck, L Bayarjargal, S Lobanov, W Morgenroth, R Luchitskaia, C Pickard, V Milman, K Refson, D Jochym, P Byrne, and B Winkler. Phase stabilities of MgCO₃ and MgCO₃-II studied by Raman spectroscopy, X-ray diffraction, and density functional theory calculations. *Physical Review Materials*, 4, 2020. doi: 10.1103/PhysRevMaterials.4.055001.
- [8] J Binck, S Chariton, M Stękiel, L Bayarjargal, W Morgenroth, V Milman, L Dubrovinsky, and B Winkler. High-pressure, high-temperature phase stability of iron-poor dolomite and the structures of dolomite-IIIc and dolomite-V. *Physics of the Earth and Planetary Interiors*, 299:106403, 2020. doi: <https://doi.org/10.1016/j.pepi.2019.106403>.
- [9] J Binck, D Laniel, L Bayarjargal, S Khandarkhaeva, T Fedotenko, A Aslandukov, K Glazyrin, V Milman, S Chariton, V B Prakapenka, N Dubrovinskaia, L Dubrovinsky, and B Winkler. Synthesis of calcium orthocarbonate, Ca₂CO₄-pnma at p-t

- conditions of earth's transition zone and lower mantle. *American Mineralogist*, 107, 2022. doi: 10.2138/am-2021-7872.
- [10] V Cerantola, C McCammon, I Kuppenko, I Y Kantor, C Marini, M Wilke, L Ismailova, N A Solopova, AI Chumakov, S Pascarelli, and L Dubrovinsky. High-pressure spectroscopic study of siderite (FeCO_3) with a focus on spin crossover. *American Mineralogist*, 100:2670–2681, 2015.
- [11] V Cerantola, E Bykova, I Kuppenko, M Merlini, L Ismailova, C McCammon, AI Chumakov, S Petitgirard, A Kantor, V Svitlyk, J Jacobs, M Hanfland, M Mezouar, C Prescher, R Ruffer, and L Dubrovinsky. Stability of iron-bearing carbonates in the deep Earth's interior. *Nature Communications*, 2017. doi:10.1038/ncomms15960.
- [12] V Cerantola, M Wilke, I Kantor, L Ismailova, I Kuppenko, C McCammon, S Pascarelli, and L Dubrovinsky. Experimental investigation of FeCO_3 (siderite) stability in Earth's lower mantle using XANES spectroscopy. *American Mineralogist*, 104(8): 083–1091, 8 2019. doi: 10.2138/am-2019-6428.
- [13] S Chariton, V Cerantola, L Ismailova, E Bykova, M Bykov, I Kuppenko, C McCammon, and L Dubrovinsky. The high-pressure behavior of spherocobaltite (CoCO_3): A single crystal Raman spectroscopy and XRD study. *Physics and Chemistry of Minerals*, pages 1–10, 2017. doi:10.1007/s00269-017-0902-5.
- [14] S Chariton, M Bykov, E Bykova, E Koemets, T Fedotenko, B Winkler, M Hanfland, V Prakapenka, E Greenberg, C McCammon, and L Dubrovinsky. The crystal structures of Fe-bearing MgCO_3 sp^2 - and sp^3 -carbonates at 98 GPa from single-crystal X-ray diffraction using synchrotron radiation. *Acta Crystallographica Section E Crystallographic Communications*, 76:715–719, 2020. doi: 10.1107/S2056989020005411.
- [15] S Chariton, C McCammon, D M Vasiukov, M Stękiel, A Kantor, V Cerantola, I Kuppenko, T Fedotenko, E Koemets, M Hanfland, AI Chumakov, and L Dubrovinsky. Seismic detectability of carbonates in the deep earth: A nuclear inelastic scattering study. *American Mineralogist*, 105(3), 2020. doi: <https://doi.org/10.2138/am-2020-6901>.
- [16] I Efthimiopoulos, S Jahn, A Kuras, U Schade, and M Koch-Müller. Combined high-pressure and high temperature vibrational studies of dolomite: phase diagram and evidence of a new distorted phase. *Physics and Chemistry of Minerals*, pages 1–12, 2017. doi:10.1007/s00269-017-0874-5.
- [17] I Efthimiopoulos, M Germer, S Jahn, M Harms, H J Reichmann, S Speziale, U Schade, M Sieber, and M Koch-Müller. Effects of hydrostaticity on the structural stability of carbonates at lower mantle pressures: the case study of dolomite. *High Pressure Research*, 39:1–14, 2018. doi: 10.1080/08957959.2018.1558223.
- [18] I Efthimiopoulos, J Müller, B Winkler, C Otzen, M Harms, U Schade, and M Koch-Müller. Vibrational response of strontianite at high pressures and high temperatures

- and construction of P - T phase diagram. *Physics and Chemistry of Minerals*, pages 1–9, 2018. doi:10.1007/s00269-018-0984-8.
- [19] C-J Fruhner, L Bayarjargal, N Schrodtt, R Luchitskaia, W Morgenroth, and B Winkler. Pressure-induced phase transition from calcite to aragonite detected by fluorescence spectroscopy. *European Journal of Mineralogy*, 30(4):711–720, 2018.
- [20] P Gavryushkin, N S Martirosyan, S V Rashchenko, D N Sagatova, N E Sagatov, R Wirth, S S Lobanov, A Semerikova, T M Fedotenko, and K D Litasov. High-pressure synthesis and ambient-pressure tem investigation of mg-orthocarbonate. *SSRN*, 2021. doi: doi:https://ssrn.com/abstract=3966096 or http://dx.doi.org/10.2139/ssrn.3966096.
- [21] J Kaa, S Sternemann, K Appel, V Cerantola, T R Preston, C Albers, M Elbers, L Libon, M Makita, A Pelka, S Petitgirard, C Plückthun, V Roddatis, C J Sahle, G Spiekermann, C Schmidt, A Schreiber, R Sakrowski, M Tolan, M Wilke, U Zastrau, and Z Konôpková. Structural and electron spin state changes in an x-ray heated iron carbonate system at the earth’s lower mantle pressures. *Phys. Rev. Research*, 128, 2022.
- [22] M Koch-Müller, S Jahn, N Birkholz, E Ritter, and U Schade. Phase transitions in the system CaCO_3 at high P and T determined by in situ vibrational spectroscopy in diamond anvil cells and first-principles simulations. *Physics and Chemistry of Minerals*, 43:545–561, 2016.
- [23] J Koenig, D Spahr, L Bayarjargal, P N Gavryushkin, D Sagatova, N Sagatov, V Milman, H-P Liermann, and B Winkler. Novel calcium sp^3 carbonate CaC_2O_5 I42d may be a carbon host in earth’s lower mantle. *ACS Earth and Space Chemistry*, 6, 2021. doi: 10.1021/acsearthspacechem.1c00284.
- [24] I Kupenko, C McCammon, R Sinmyo, V Cerantola, V Potapkin, AI Chumakov, A Kantor, R Rueffer, and L Dubrovinsky. Oxidation state of the lower mantle: In situ observations of the iron electronic configuration in bridgmanite at extreme conditions. *Earth and Planetary Science Letters*, 423:78–86, 2015.
- [25] I Kupenko, C Strohm, C McCammon, V Cerantola, K Glazyrin, S Petitgirard, D Vasiukov, G Aprilis, AI Chumakov, R Rueffer, and L Dubrovinsky. Time differentiated nuclear resonance spectroscopy coupled with pulsed laser heating in diamond anvil cells. *Reviews of Scientific Instruments*, 86:114501–114508, 2015.
- [26] D Laniel, J Binck, B Winkler, S Vogel, T Fedotenko, S Chariton, V Prakapenka, V Milman, W Schnick, L Dubrovinsky, and N Dubrovinskaia. Synthesis, crystal structure and structure–property relations of strontium orthocarbonate, Sr_2CO_4 . *Acta Crystallographica Section B Structural Science, Crystal Engineering and Materials*, 77, 2021. doi: 10.1107/S2052520620016650.

- [27] S Lobanov and A Goncharov. *Pressure-Induced sp^2 - sp^3 Transitions in Carbon-Bearing Phases*, pages 1–9. John Wiley and Sons, 2020. ISBN 9781119508229. doi: 10.1002/9781119508229.ch1.
- [28] S Lobanov, S Speziale, B Winkler, V Milman, K Refson, and L Schifferle. Electronic, structural, and mechanical properties of SiO_2 glass at high pressure inferred from its refractive index. *Physical review letters*, 128, 2022. doi: 10.1103/PhysRevLett.128.077403.
- [29] NS Martirosyan, K Litasov, S Lobanov, A F Goncharov, A Shatskiy, H Ohfuji, and V Prakapenka. The Mg-carbonate–Fe interaction: Implication for the fate of subducted carbonates and formation of diamond in the lower mantle. *Geoscience Frontiers*, 10(4):1449–1458, 2019. doi: 10.1016/j.gsf.2018.10.003.
- [30] NS Martirosyan, A Shatskiy, AD Chanyshv, KD Litasov, IV Podborodnikov, and T Yoshino. Effect of water on the magnesite–iron interaction, with implications for the fate of carbonates in the deep mantle. *Lithos*, 326–327:435–445, 2019. doi: 10.1016/j.lithos.2019.01.004.
- [31] NS Martirosyan, I Efthimiopoulos, L Pennacchioni, R Wirth, S Jahn, and M. Koch-Müller. Effect of cationic substitution on the pressure-induced phase transitions in calcium carbonate. *American Mineralogist*, 106:549–558, 2021. doi: <https://doi.org/10.2138/am-2020-7547>.
- [32] C McCammon. *Mössbauer Spectroscopy with High Spatial Resolution: Spotlight on Geoscience*, pages 221–266. Springer Singapore, 2021. ISBN 978-981-15-9422-9. doi: doi:10.1007/978-981-15-9422-9-5.
- [33] C McCammon, H Bureau, H J Cleaves II, E Cottrell, S M Dorfman, L H Kellogg, J Li, S Mikhail, Y Moussallam, C Sanloup, A R Thomson, and A Vitale-Brovarone. Deep earth carbon reactions through time and space. *American Mineralogist*, 105: 22–27, 2020. doi: doi:10.2138/am-2020-6888CCBY.
- [34] J Müller, S Speziale, I Efthimiopoulos, S Jahn, and M Koch-Müller. Raman spectroscopy of siderite at high pressure: Evidence for a sharp spin transition. *American Mineralogist*, 101:2638–2644, 2016.
- [35] J Müller, I Efthimiopoulos, S Jahn, and M Koch-Müller. Effect of temperature on the pressure-induced spin transition in siderite and ferromagnesite derived from Raman spectroscopy. *European Journal of Mineralogy*, 2017. doi:10.1007/s00269-017-0874-5.
- [36] J Müller, M Koch-Müller, D Rhede, F Wilke, and R Wirth. Melting relations in the system CaCO_3 – MgCO_3 at 6 GPa. *American Mineralogist*, 2017. doi:10.2138/am-2017-5831.

- [37] TT Nguyen, A Bosak, JD Bauer, R Luchitskaia, K Refson, V Milman, and B Winkler. Lattice dynamics and elasticity of SrCO₃. *Journal of Applied Crystallography*, 49:1–9, 2016.
- [38] A Nyrow, C Sternemann, JS Tse, C Weis, CJ Sahle, K Mende, F Wieland, V Cerantola, RA Gordon, G Spiekermann, T Regier, M Wilke, and M Tolan. Bulk sensitive determination of the Fe³⁺/Fe_{Tot}-ratio in minerals by Fe L_{2/3}-edge X-ray Raman scattering. *Journal of Analytical Atomic Spectrometry*, 31:815–820, 2016.
- [39] S Petitgirard, G Spiekermann, C Weis, CJ Sahle, C Sternemann, and M Wilke. Miniature diamond anvils for X-ray Raman scattering spectroscopy experiments at high pressure. *Journal of Synchrotron Radiation*, 24:276–282, 2017.
- [40] C Prescher, L Dubrovinsky, E Bykova, I Kuppenko, K Glazyrin, A Kantor, C McCammon, M Mookherjee, Y Nakajima, N Miyajima, R Sinmyo, V Cerantola, N Dubrovinskaia, V Prakapenka, R Rüffer, AI Chumakov, and M Hanfland. High Poisson’s ratio of Earth’s inner core explained by carbon alloying. *Nature Geoscience*, 8:220–223, 2015.
- [41] T Schlothauer, C Schimpf, E Brendler, K Keller, E Kroke, and G Heide. Halide based shock-wave treatment of fluid-rich natural phases. *Journal of Physics: Conference Series*, 635:1–12, 2015.
- [42] T Schlothauer, C Schimpf, MR Schwarz, G Heide, and E Kroke. The role of decompression and micro-jetting in shock wave synthesis experiments. *Journal of Physics: Conference Series*, 774:12053, 2016.
- [43] M Sieber, F Wilke, and M Koch-Müller. Partition Coefficients of trace elements between carbonates and melt and suprasolidus phase relations of Ca-Mg-carbonates at 6 GPa. *American Mineralogist*, 105:922–931, 2020. doi: 10.2138/am-2020-7098.
- [44] NA Solopova, L Dubrovinsky, AV Spivak, YA Litvin, and N Dubrovinskaia. Melting and decomposition of MgCO₃ at pressures up to 84 GPa. *Physics and Chemistry of Minerals*, 42:73–81, 2015.
- [45] D Spahr, L Bayarjargal, V Vinograd, R Luchitskaia, V Milman, and B Winkler. A new BaCaCO₃)₂ polymorph. *Acta Crystallographica Section B*, 75(3), 2019. doi: 10.1107/S2052520619003238.
- [46] D Spahr, J Binck, L Bayarjargal, R Luchitskaia, W Morgenroth, D Comboni, V Milman, and B Winkler. Tetrahedrally coordinated sp³-hybridized carbon in Sr₂CO₄ orthocarbonate at ambient conditions. *Inorganic Chemistry*, 60, 2021. doi: 10.1021/acs.inorgchem.1c00159.
- [47] D Spahr, J Koenig, L Bayarjargal, P N Gavryushkin, V Milman, H-P Liermann, and B Winkler. Sr₃[CO₄]O antiperovskite with tetrahedrally coordinated sp³-hybridized carbon and OSr₆ octahedra. *Inorganic Chemistry*, 60, 2021. doi: 10.1021/acs.inorgchem.1c01900.

- [48] D Spahr, J Koenig, L Bayarjargal, V Milman, M P Persson, and B Winkler. Structural, physical, and thermodynamic properties of aragonitic $\text{Ca}_x\text{Sr}_{1-x}\text{CO}_3$ solid solutions. *Journal of Physical Chemistry*, 125, 2021. doi: 10.1021/acs.jpcc.1c04703.
- [49] D Spahr, J Koenig, L Bayarjargal, V Milman, A Perlov, H-P Liermann, and B Winkler. $\text{Sr}[\text{C}_2\text{O}_5]$ is an inorganic pyrocarbonate salt with $[\text{C}_2\text{O}_5]^{2-}$ complex anions. *Journal of the American Chemical Society*, 144, 2022. doi: 10.1021/jacs.2c00351.
- [50] S Speziale, F Castorina, P Censi, C de Barros Gomes, L Soares Marques, and P Comin-Chiaramonti. Carbonatites from the southern brazilian platform: I. *Open Geosciences*, 12, 2020. doi: <https://doi.org/10.1515/geo-2020-0050>.
- [51] S Speziale, F Castorina, P Censi, C de Barros Gomes, L Soares Marques, and P Comin-Chiaramonti. Carbonatites from the southern brazilian platform: A review. ii: Isotopic evidences. *Open Geosciences*, 12, 2020. doi: <https://doi.org/10.1515/geo-2020-0032>.
- [52] G Spiekermann, I Kuppenko, S Petitgirard, M Harder, A Nyrow, C Weis, C Albers, N Biedermann, I Libon, C J Sahle, V Cerantola, K Glazyrin, Z Konopkova, R Simyo, W Morgenroth, I Sergueev, H Yava, L Dubrovinsky, M Tolan, C Sternemann, and Max Wilke. A portable on-axis laser-heating system for near-90 degrees x-ray spectroscopy: application to ferropericlase and iron silicide. *Journal of Synchrotron Radiation*, 27, 2020. doi: 10.1107/S1600577519017041.
- [53] G Spiekermann, L Libon, C Albers, R Sakrowski, S Petitgirard, C J Sahle, M Sundermann, H Gretarsson, I Sergueev, C Sternemann, M Wilke, and M Murakami. Reflective imaging, on-axis laser heating and radiospectrometry of samples in diamond anvil cells with a parabolic mirror. *High Pressure Research*, 41, 2021. doi: 10.1080/08957959.2021.1921173.
- [54] AV Spivak, NA Solopova, V Cerantola, E Bykova, E Zakharchenko, L Dubrovinsky, and YA Litvin. Raman study of $\text{MgCO}_3\text{-FeCO}_3$ carbonate solid solution at high pressures up to 55 GPa. *Physics and Chemistry of Minerals*, 41:633–638, 2014.
- [55] AV Spivak, NA Solopova, L Dubrovinsky, and YA Litvin. Melting relations of multicomponent carbonate $\text{MgCO}_3\text{-FeCO}_3\text{-CaCO}_3\text{-Na}_2\text{CO}_3$ system at 12–26 GPa: application to deeper mantle diamond formation. *Physics and Chemistry of Minerals*, 42:817–824, 2015.
- [56] AV Spivak, NA Solopova, LS Dubrovinsky, and YA Litvin. The system $\text{MgCO}_3\text{-FeCO}_3\text{-CaCO}_3\text{-Na}_2\text{CO}_3$ at 12–23 GPa: Phase relations and significance for the genesis of ultradeep diamonds. *Doklady Earth Sciences*, 464:946–950, 2015.
- [57] V Stagno, V Cerantola, S Aulbach, S Lobanov, C McCammon, and M Merlini. *Carbon-Bearing Phases throughout Earth’s Interior: Evolution through Space and Time*, pages 66–88. Cambridge University Press, 10 2019. ISBN 9781108477499. doi: 10.1017/9781108677950.004.

- [58] M Stękiel, T Nguyen Thanh, S Chariton, C McCammon, A Bosak, W Morgenroth, V Milman, K Refson, and B Winkler. High pressure elasticity of FeCO_3 – MgCO_3 carbonates. *Physics of the Earth and Planetary Interiors*, 271:57–63, 2017.
- [59] M Stękiel, A Girard, T Nguyen-Thanh, A Bosak, V Milman, and B Winkler. Phonon-driven phase transitions in calcite, dolomite, and magnesite. *Physical Review B*, 99, 2019. doi:10.1103.
- [60] C Sternemann and M Wilke. Spectroscopy of low and intermediate Z elements at extreme conditions: In-situ studies of Earth materials at pressure and temperature via X-ray Raman scattering. *High Pressure Research*, 36:275–292, 2016.
- [61] MN Taran, J Müller, A Friedrich, and M Koch-Müller. High-pressure optical spectroscopy study of natural siderite. *Physics and Chemistry of Minerals*, 2017. doi:10.1007/s00269-017-0880-7.
- [62] C Weis, C Sternemann, V Cerantola, Sahle CJ, G Spiekermann, M Harder, Y Forov, A Kononov, R Sakrowski, H Yavaş, M Tolan, and M Wilke. Pressure driven spin transition in siderite and magnesiosiderite single crystals. *Scientific Reports* 7, 2017. doi:10.1038/s41598-017-16733-3.
- [63] C Weis, G Spiekermann, C Sternemann, M Harder, G Vankó, V Cerantola, Sahle CJ, Y Forov, R Sakrowski, I Kuppenko, S Petitgirard, H Yavaş, C Bressler, W Gawelda, M Tolan, and M Wilke. Combining X-ray $K\beta_{1,3}$, valence-to-core, and X-ray Raman spectroscopy for studying Earth materials at high pressure and temperature: the case of siderite. *Journal of Analytic Atomic Spectrometry*, 34:384–393, 2019. doi:10.1039/C8JA00247A.