

## ROSS JOHN ANGEL M.A. Ph.D.

### PUBLICATIONS – FULL LISTING

#### Journal articles:

- [1] Angel RJ (1984) The experimental determination of the johannsenite-bustamite equilibrium inversion boundary. *Contributions to Mineralogy and Petrology* 85:272-278.
- [2] Angel RJ, Price GD, Putnis A (1984) A mechanism for pyroxene-pyroxenoid and pyroxenoid-pyroxenoid transformations. *Physics and Chemistry of Minerals* 10:236-243.
- [3] Angel RJ (1985) Structural variation in wollastonite and bustamite. *Mineralogical Magazine* 49:37-48.
- [4] Angel RJ, Price GD, Yeomans J (1985) The energetics of polytypic systems: Further applications of the ANNNI model. *Acta Crystallographica B* 40:310-318.
- [5] Putnis A, Angel RJ (1985) Al,Si ordering in cordierite using "magic angle spinning" NMR. II: models of Al,Si order from NMR data. *Physics and Chemistry of Minerals* 12:193-204.
- [6] Angel RJ (1986) Transformation mechanisms between single-chain silicates. *American Mineralogist* 71:1441-1454.
- [7] Angel RJ (1986) Polytypes and polytypism. *Zeitschrift für Kristallographie* 176:193-204.
- [8] Angel RJ, Prewitt CT (1986) Crystal structure of mullite - a reexamination of the average structure. *American Mineralogist* 71:1476-1482.
- [9] Angel RJ, Prewitt CT (1987) The incommensurate structure of mullite by Patterson synthesis. *Acta Crystallographica B* 43:116-126.
- [10] Hazen RM, Finger LW, Angel RJ, Prewitt CT, Ross NL, Mao HK, Hadidiacos CG, Hor PH, Meng RL, Chu CW (1987) Crystallographic description of phases in the Y-Ba-Cu-O superconductor. *Physical Review B* 35:7238-7241.
- [11] Ross NL, Angel RJ, Finger LW, Hazen RM, Prewitt CT (1987) Oxygen-defect perovskites and the 93K superconductor. *ACS Symposium Series* 351:164-172.
- [12] Angel RJ (1988) High-pressure structure of anorthite. *American Mineralogist* 73:1114-1119.
- [13] Angel RJ, Finger LW (1988) Polymorphism of nickel sulfate hexahydrate. *Acta Crystallographica C* 44:1869-1873.
- [14] Angel RJ, Gasparik T, Ross NL, Finger LW, Prewitt CT, Hazen RM (1988) A silica-rich sodium pyroxene phase with six-coordinated silicon. *Nature* 335:156-158.
- [15] Angel RJ, Hazen RM, McCormick TC, Prewitt CT, Smyth JR (1988) Comparative compressibility of end-member feldspars. *Physics and Chemistry of Minerals* 15:313-318.

- [16] Hazen RM, Finger LW, Angel RJ, Prewitt CT, Ross NL, Hadidiacos CG, Heaney PJ, Veblen DR, Sheng ZZ, Elali A, Hermann AM (1988) 100K superconducting phases in the Tl-Ca-Ba-C-O system. *Physical Review Letters* 60:1657-1660.
- [17] Hazen RM, Prewitt CT, Angel RJ, Ross NL, Finger LW, Hadidiacos CG, Veblen DR, Heaney PJ, Hor PH, Meng RL, Sun YY, Wang YQ, Xue YY, Huang ZJ, Gao L, Bechtold J, Chu CW (1988) Superconductivity in the high Tc Bi-Ca-Sr-Cu-O system: Phase identification. *Physical Review Letters* 60:1174-1177.
- [18] Meng RL, Hor PH, Sun YY, Huang ZJ, Gao L, Xue YY, Wang Y, Bechtold J, Chu CW, Hazen RM, Prewitt CT, Angel RJ, Ross NL, Finger LW, Hadidiacos CG (1988) The 120 K superconducting phase in Bi-Ca-Sr-Cu-O. *Modern Physics Letters* 2:543-549.
- [19] Veblen DR, Heaney PJ, Angel RJ, Finger LW, Hazen RM, Prewitt CT, Ross NL, Chu CW, Hor PH, Meng RL (1988) Crystallography, chemistry and structural disorder in the new high-Tc Bi-Ca-Sr-Cu-O superconductor. *Nature* 332:334-337.
- [20] Angel RJ, Finger LW, Hazen RM, Kanzaki M, Weidner DJ, Liebermann RC, Veblen DR (1989) Structure and twinning of single-crystal MgSiO<sub>3</sub> garnet synthesised at 17 GPa and 1800°C. *American Mineralogist* 74:509-512.
- [21] Angel RJ, Gasparik T, Finger LW (1989) Crystal structure of a Cr<sup>2+</sup>-bearing pyroxene. *American Mineralogist* 74:599-603.
- [22] Angel RJ, Redfern SAT, Ross NL (1989) Spontaneous strain below the I-1 - P-1 transition in anorthite at pressure. *Physics and Chemistry of Minerals* 16:539-544.
- [23] McCormick TC, Hazen RM, Angel RJ (1989) Compressibility of omphacite to 60 Kbar - role of vacancies. *American Mineralogist* 74:1287-1292.
- [24] Angel RJ, Carpenter MA, Finger LW (1990) Structural variation associated with compositional variation and order-disorder behavior in anorthite-rich feldspars. *American Mineralogist* 75:150-162.
- [25] Angel RJ, Cressey G, Criddle A (1990) Edgarbaileyite, Hg<sub>6</sub>Si<sub>2</sub>O<sub>7</sub>: the crystal structure of the first mercury silicate. *American Mineralogist* 75:1192-1196.
- [26] Angel RJ, Ross NL, Finger LW, Hazen RM (1990) Ba<sub>3</sub>CaCuSi<sub>6</sub>O<sub>17</sub> - a new {**IB**,1<sup>1</sup><sub>inf</sub>}[<sup>4</sup>Si<sub>6</sub>O<sub>17</sub>] chain silicate. *Acta Crystallographica C* 46:2028-2030.
- [27] Carpenter MA, Angel RJ, Finger LW (1990) Calibration of Al/Si order variations in anorthite. *Contributions to Mineralogy and Petrology* 104:471-480.
- [28] Roberts AC, Bonardi M, Erd RC, Criddle J, Stanley CJ, Cressey G, Angel RJ, Laflamme JHG (1990) Edgarbaileyite, the first known silicate of mercury, from California and Texas. *Mineralogical Record* 21:215-220.
- [29] Angel RJ, Burnham CW (1991) Pyroxene-pyroxenoid polysomatism revisited - a clarification. *American Mineralogist* 76:900-903.
- [30] Angel RJ, McMullan RK, Prewitt CT (1991) Substructure and superstructure of mullite by neutron diffraction. *American Mineralogist* 76:332-342.
- [31] Ross NL, Angel RJ (1991) Crystal-structure of high-pressure SrB<sub>2</sub>O<sub>4</sub>(IV). *Journal of Solid State Chemistry* 90:27-30.

- [32] Angel RJ (1992) Order-disorder and the high-pressure P-1 - I-1 transition in anorthite. *American Mineralogist* 77:923-929.
- [33] Angel RJ, Chopelas A, Ross NL (1992) Stability of high-density clinoenstatite at upper-mantle pressures. *Nature* 358:322-324.
- [34] Angel RJ, Ross NL, Wood IG, Woods PA (1992) Single crystal X-ray diffraction at high pressures with diamond-anvil cells. *Phase Transitions* 39:13-32.
- [35] Chandley P, Clark RJH, Angel RJ, Price GD (1992) Site preference of vanadium doped into ZrSiO<sub>4</sub> and ZrGeO<sub>4</sub>. *Journal of the Chemical Society, Dalton Transactions* 1579-1584.
- [36] Hackwell TP, Angel RJ (1992) The comparative compressibility of reedmergnerite, danburite and their aluminum analogues. *European Journal of Mineralogy* 4:1221-1227.
- [37] Liu RS, Hughes SD, Angel RJ, Hackwell TP, Mackenzie AP, Edwards PP (1992) Crystal structure and cation stoichiometry of superconducting Tl<sub>2</sub>Ba<sub>2</sub>CuO<sub>6+d</sub> single crystals. *Physica C* 198:203-208.
- [38] Angel RJ (1993) The high-pressure, high-temperature equation of state of calcium-fluoride, CaF<sub>2</sub>. *Journal of Physics-Condensed Matter* 5:L141-L144.
- [39] Angel RJ, Hugh-Jones DA (1994) Equations of state and thermodynamic properties of enstatite pyroxenes. *Journal of Geophysical Research-Solid Earth* 99:19777-19783.
- [40] Christy AG, Angel RJ, Haines J, Clark SM (1994) Crystal structure variation and phase transition in caesium trichlorocuprate at high pressure. *Journal of Physics-Condensed Matter* 6:3125-3136.
- [41] Hayward CL, Angel RJ, Ross NL (1994) The structural redetermination and crystal chemistry of sinhalite, MgAlBO<sub>4</sub>. *European Journal of Mineralogy* 6:313-321.
- [42] Hugh-Jones DA, Angel RJ (1994) A compressional study of MgSiO<sub>3</sub> orthoenstatite up to 8.5 GPa. *American Mineralogist* 79:405-410.
- [43] Hugh-Jones DA, Woodland AB, Angel RJ (1994) The structure of high-pressure C2/c ferrosilite and crystal-chemistry of high-pressure C2/c pyroxenes. *American Mineralogist* 79:1032-1041.
- [44] Christy AG, Angel RJ (1995) A model for the origin of the cell doubling transitions in clinopyroxene and body-centered anorthite. *Physics and Chemistry of Minerals* 22:129-135.
- [45] Hackwell TP, Angel RJ (1995) Reversed brackets for the P-1 - I-1 transition in anorthite at high-pressures and temperatures. *American Mineralogist* 80:239-246.
- [46] Wentzcovitch RM, Hughjones DA, Angel RJ, Price GD (1995) Ab-initio study of MgSiO<sub>3</sub> C2/c enstatite. *Physics and Chemistry of Minerals* 22:453-460.
- [47] Allan DR, Miletich R, Angel RJ (1996) A diamond-anvil cell for single-crystal X-ray diffraction studies to pressures in excess of 10 GPa. *Review of Scientific Instruments* 67:840-842.
- [48] Angel RJ (1996) New phenomena in minerals at high pressures. *Phase Transitions* 59:105-119.

- [49] Angel RJ, Ross NL (1996) Compression mechanisms and equations of state. *Philosophical Transactions of the Royal Society of London Series a-Mathematical Physical and Engineering Sciences* 354:1449-1459.
- [50] Angel RJ, Ross NL, Seifert F, Fliervoet TF (1996) Structural characterization of pentacoordinate silicon in a calcium silicate. *Nature* 384:441-444.
- [51] Hugh-Jones DA, Sharp T, Angel RJ, Woodland AB (1996) The transition of orthoferrosilite to high-pressure C2/c clinoferrosilite at ambient temperature. *European Journal of Mineralogy* 8:1337-1345.
- [52] Allan DR, Angel RJ (1997) A high-pressure structural study of microcline (KAlSi<sub>3</sub>O<sub>8</sub>) to 7 GPa. *European Journal of Mineralogy* 9:263-275.
- [53] Angel RJ (1997) Transformation of fivefold-coordinated silicon to octahedral silicon in calcium silicate, CaSi<sub>2</sub>O<sub>5</sub>. *American Mineralogist* 82:836-839.
- [54] Angel RJ, Allan DR, Miletich R, Finger LW (1997) The use of quartz as an internal pressure standard in high-pressure crystallography. *Journal of Applied Crystallography* 30:461-466.
- [55] Angel RJ, Ross NL (1997) Equations of state of mantle minerals from high-pressure diffraction. *Physics and Chemistry of the Earth* 22:119-123.
- [56] Hugh-Jones D, Chopelas A, Angel RJ (1997) Tetrahedral compression in (Mg,Fe)SiO<sub>3</sub> orthopyroxenes. *Physics and Chemistry of Minerals* 24:301-310.
- [57] Hugh-Jones DA, Angel RJ (1997) Effect of Ca<sup>2+</sup> and Fe<sup>2+</sup> on the equation of state of MgSiO<sub>3</sub> orthopyroxene. *Journal of Geophysical Research-Solid Earth* 102:12333-12340.
- [58] Miletich R, Allan DR, Angel RJ (1997) The synthetic Cr<sup>2+</sup> silicates BaCrSi<sub>4</sub>O<sub>10</sub> and SrCrSi<sub>4</sub>O<sub>10</sub>: The missing links in the gillespite-type ABSi<sub>4</sub>O<sub>10</sub> series. *American Mineralogist* 82:697-707.
- [59] Woodland AB, Angel RJ (1997) Reversal of the orthoferrosilite-high-P clinoferrosilite transition, a phase diagram for FeSiO<sub>3</sub> and implications for the mineralogy of the Earth's upper mantle. *European Journal of Mineralogy* 9:245-254.
- [60] Woodland AB, McCammon C, Angel RJ (1997) Intersite partitioning of Mg and Fe in Ca-free high-pressure C2/c clinopyroxene. *American Mineralogist* 82:923-930.
- [61] Allan DR, Kelsey AA, Clark SJ, Angel RJ, Ackland GJ (1998) High-pressure semiconductor-semimetal transition in TiS<sub>2</sub>. *Physical Review B* 57:5106-5110.
- [62] Angel RJ, McCammon C, Woodland AB (1998) Structure, ordering and cation interactions in Ca-free P2<sub>1</sub>/c clinopyroxenes. *Physics and Chemistry of Minerals* 25:249-258.
- [63] Angel RJ, Woodland AB (1998) Crystal structure of spinelloid II in the system Fe<sub>2</sub>SiO<sub>4</sub>-Fe<sub>3</sub>O<sub>4</sub>. *European Journal of Mineralogy* 10:607-611.
- [64] Arlt T, Angel RJ, Miletich R, Armbruster T, Peters T (1998) High-pressure P2<sub>1</sub>/c-C2/c phase transitions in clinopyroxenes: Influence of cation size and electronic structure. *American Mineralogist* 83:1176-1181.
- [65] Knoche R, Angel RJ, Seifert F, Fliervoet TF (1998) Complete substitution of Si for Ti in titanite Ca(Ti<sub>1-x</sub>Si<sub>x</sub>)<sup>VI</sup>Si<sup>IV</sup>O<sub>5</sub>. *American Mineralogist* 83:1168-1175.

- [66] Miletich R, Allan DR, Angel RJ (1998) Structural control of polyhedral compression in synthetic braunite,  $Mn^{2+}Mn^{3+}O_8SiO_4$ . *Physics and Chemistry of Minerals* 25:183-192.
- [67] Miletich R, Seifert F, Angel RJ (1998) Compression of cadmium orthosilicate,  $Cd_2SiO_4$ : a high-pressure single-crystal diffraction study. *Zeitschrift für Kristallographie* 213:288-295.
- [68] Reichmann HJ, Angel RJ, Spetzler H, Bassett WA (1998) Ultrasonic interferometry and X-ray measurements on MgO in a new diamond anvil cell. *American Mineralogist* 83:1357-1360.
- [69] Schmidt MW, Finger LW, Angel RJ, Dinnebier RE (1998) Synthesis, crystal structure, and phase relations of  $AlSiO_3OH$ , a high-pressure hydrous phase. *American Mineralogist* 83:881-888.
- [70] Woodland AB, Angel RJ (1998) Crystal structure of a new spinelloid with the wadsleyite structure in the system  $Fe_2SiO_4-Fe_3O_4$  and implications for the Earth's mantle. *American Mineralogist* 83:404-408.
- [71] Angel R, Seifert F (1999) The effect of pressure on cation ordering in minerals: Problems and perspectives. *Phase Transitions* 69:1-16.
- [72] Angel RJ, Bismayer U (1999) Renormalization of the phase transition in lead phosphate,  $Pb_3(PO_4)_2$ , by high pressure: lattice parameters and spontaneous strain. *Acta Crystallographica B* 55:896-901.
- [73] Angel RJ, Kunz M, Miletich R, Woodland AB, Koch M, Knoche RL (1999) Effect of isovalent Si,Ti substitution on the bulk moduli of  $Ca(Ti_{1-x}Si_x)SiO_5$  titanites. *American Mineralogist* 84:282-287.
- [74] Angel RJ, Kunz M, Miletich R, Woodland AB, Koch M, Xirouchakis D (1999) High-pressure phase transition in  $CaTiOSiO_4$  titanite. *Phase Transitions* 68:533-543.
- [75] Becerro AI, McCammon C, Langenhorst F, Seifert F, Angel R (1999) Oxygen vacancy ordering in  $CaTiO_3-CaFeO_{2.5}$  perovskites: From isolated defects to infinite sheets. *Phase Transitions* 69:133-146.
- [76] Brunet F, Allan DR, Redfern SAT, Angel RJ, Miletich R, Reichmann HJ, Sergent J, Hanfland M (1999) Compressibility and thermal expansivity of synthetic apatites,  $Ca_5(PO_4)_3X$  with X = OH, F and Cl. *European Journal of Mineralogy* 11:1023-1035.
- [77] Chakraborty S, Knoche R, Schulze H, Rubie DC, Dobson D, Ross NL, Angel RJ (1999) Enhancement of cation diffusion rates across the 410-kilometer discontinuity in Earth's mantle. *Science* 283:362-365.
- [78] Gautron L, Angel RJ, Miletich R (1999) Structural characterisation of the high-pressure phase  $CaAl_4Si_2O_{11}$ . *Physics and Chemistry of Minerals* 27:47-51.
- [79] Miletich R, Nowak M, Seifert F, Angel RJ, Brandstatter G (1999) High-pressure crystal chemistry of chromous orthosilicate,  $Cr_2SiO_4$ . A single-crystal X-ray diffraction and electronic absorption spectroscopy study. *Physics and Chemistry of Minerals* 26:446-459.
- [80] Redfern SAT, Angel RJ (1999) High-pressure behaviour and equation of state of calcite,  $CaCO_3$ . *Contributions to Mineralogy and Petrology* 134:102-106.

- [81] Ross NL, Angel RJ (1999) Compression of CaTiO<sub>3</sub> and CaGeO<sub>3</sub> perovskites. *American Mineralogist* 84:277-281.
- [82] Warren MC, Redfern SAT, Angel R (1999) Change from six-fold to five-fold coordination of silicate polyhedra: Insights from first-principles calculations of CaSi<sub>2</sub>O<sub>5</sub>. *Physical Review B* 59:9149-9154.
- [83] Woodland AB, Angel RJ, Koch M, Kunz M, Miletich R (1999) Equations of state for Fe<sup>2+</sup><sub>3</sub>Fe<sup>3+</sup><sub>2</sub>Si<sub>3</sub>O<sub>12</sub> "skiagite" garnet and Fe<sub>2</sub>SiO<sub>4</sub>-Fe<sub>3</sub>O<sub>4</sub> spinel solid solutions. *Journal of Geophysical Research-Solid Earth* 104:20049-20058.
- [84] Arlt T, Angel RJ (2000) Pressure buffering in a diamond anvil cell. *Mineralogical Magazine* 64:241-245.
- [85] Arlt T, Angel RJ (2000) Displacive phase transitions in C-centred clinopyroxenes: spodumene, LiScSi<sub>2</sub>O<sub>6</sub> and ZnSiO<sub>3</sub>. *Physics and Chemistry of Minerals* 27:719-731.
- [86] Arlt T, Kunz M, Stolz J, Armbruster T, Angel RJ (2000) P-T-X data on P2<sub>1</sub>/c-clinopyroxenes and their displacive phase transitions. *Contributions to Mineralogy and Petrology* 138:35-45.
- [87] Bassett WA, Reichmann HJ, Angel RJ, Spetzler H, Smyth JR (2000) New diamond anvil cells for gigahertz ultrasonic interferometry and X-ray diffraction. *American Mineralogist* 85:283-287.
- [88] Becerro AI, Langenhorst F, Angel RJ, Marion S, McCammon CA, Seifert F (2000) The transition from short-range to long-range ordering of oxygen vacancies in CaFe<sub>x</sub>Ti<sub>1-x</sub>O<sub>3-x/2</sub> perovskites. *Physical Chemistry Chemical Physics* 2:3933-3941.
- [89] Becerro AI, Seifert F, Angel RJ, Rios S, McCammon C (2000) Displacive phase transitions and spontaneous strains in oxygen deficient CaFe<sub>x</sub>Ti<sub>1-x</sub>O<sub>3-x/2</sub> perovskites (0 <= x <= 0.40). *Journal of Physics-Condensed Matter* 12:3661-3670.
- [90] Boffa-Ballaran T, Angel RJ, Carpenter MA (2000) High-pressure transformation behaviour of the cummingtonite- grunerite solid solution. *European Journal of Mineralogy* 12:1195-1213.
- [91] McCammon CA, Becerro AI, Langenhorst F, Angel RJ, Marion S, Seifert F (2000) Short-range ordering of oxygen vacancies in CaFe<sub>x</sub>Ti<sub>1-x</sub>O<sub>3-x/2</sub> perovskites (0 < x < 0.4). *Journal of Physics-Condensed Matter* 12:2969-2984.
- [92] McConnell JDC, McCammon CA, Angel RJ, Seifert F (2000) The nature of the incommensurate structure in akermanite, Ca<sub>2</sub>MgSi<sub>2</sub>O<sub>7</sub>, and the character of its transformation from the normal structure. *Zeitschrift für Kristallographie* 215:669-677.
- [93] Smyth JR, Jacobsen SD, Swope RJ, Angel RJ, Arlt T, Domanik K, Holloway JR (2000) Crystal structures and compressibilities of synthetic 2M(1) and 3T phengite micas. *European Journal of Mineralogy* 12:955-963.
- [94] Woodland AB, Angel RJ (2000) Phase relations in the system fayalite-magnetite at high pressures and temperatures. *Contributions to Mineralogy and Petrology* 139:734-747.
- [95] Angel RJ, Bismayer U, Marshall WG (2001) Renormalization of the phase transition in lead phosphate, Pb<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>, by high pressure: structure. *Journal of Physics-Condensed Matter* 13:5353-5364.

- [96] Angel RJ, Frost DJ, Ross NL, Hemley R (2001) Stabilities and equations of state of dense hydrous magnesium silicates. *Physics of the Earth and Planetary Interiors* 127:181-196.
- [97] Angel RJ, Mosenfelder JL, Shaw CSJ (2001) Anomalous compression and equation of state of coesite. *Physics of the Earth and Planetary Interiors* 124:71-79.
- [98] Kung J, Angel RJ, Ross NL (2001) Elasticity of CaSnO<sub>3</sub> perovskite. *Physics and Chemistry of Minerals* 28:35-43.
- [99] Angel RJ, Jackson JM (2002) Elasticity and equation of state of orthoenstatite, MgSiO<sub>3</sub>. *American Mineralogist* 87:558-561.
- [100] Jacobsen SD, Reichmann HJ, Spetzler HA, Mackwell SJ, Smyth JR, Angel RJ, McCammon CA (2002) Structure and elasticity of single-crystal (Mg,Fe)O and a new method of generating shear waves for gigahertz ultrasonic interferometry. *Journal of Geophysical Research-Solid Earth* 107:
- [101] Jacobsen SD, Spetzler H, Reichmann HJ, Smyth JR, Mackwell SJ, Angel RJ, Bassett WA (2002) Gigahertz ultrasonic interferometry at high P and T: New tools for obtaining a thermodynamic equation of state. *Journal of Physics Condensed Matter* 14:11525-11530.
- [102] Ross NL, Angel RJ, Seifert F (2002) Compressibility of brownmillerite (Ca<sub>2</sub>Fe<sub>2</sub>O<sub>5</sub>): effect of vacancies on the elastic properties of perovskites. *Physics of the Earth and Planetary Interiors* 129:145-151.
- [103] Andrault D, Angel RJ, Mosenfelder JL, Le Bihan T (2003) Equation of state of stishovite to lower mantle pressures. *American Mineralogist* 88:301-307.
- [104] Angel RJ (2003) Automated profile analysis for single-crystal diffraction data. *Journal of Applied Crystallography* 36:295-300.
- [105] Angel RJ, Shaw CSJ, Gibbs GV (2003) Compression mechanisms of coesite. *Physics and Chemistry of Minerals* 30:167-176.
- [106] Boffa-Ballaran T, Angel RJ (2003) Equation of state and high-pressure phase transitions in lawsonite. *European Journal of Mineralogy* 15:241-246.
- [107] Varga T, Wilkinson AP, Angel RJ (2003) Fluorinert as a pressure-transmitting medium for high-pressure diffraction studies. *Review of Scientific Instruments* 74:4564-4566.
- [108] Angel RJ (2004) Equations of state of plagioclase feldspars. *Contributions to Mineralogy and Petrology* 146:506-512.
- [109] Angel RJ (2004) Absorption corrections for diamond-anvil pressure cells implemented in a software package Absorb-6.0. *Journal of Applied Crystallography* 37:486-492.
- [110] Angel RJ, Bismayer U, Marshall WG (2004) Local and long range order in ferroelastic lead phosphate at high pressure. *Acta Crystallographica B* 60:1-9.
- [111] Koch M, Woodland AB, Angel RJ (2004) Stability of spinelloid phases in the system Mg<sub>2</sub>SiO<sub>4</sub>-Fe<sub>2</sub>SiO<sub>4</sub>-Fe<sub>3</sub>O<sub>4</sub> at 1100°C and up to 10.5 GPa. *Physics of the Earth and Planetary Interiors* 143:178-183.

- [112] Ross NL, Zhao J, Angel RJ (2004) High-pressure structural behavior of GdAlO<sub>3</sub> and GdFeO<sub>3</sub> perovskites. *Journal of Solid State Chemistry* 177:3768-3775.
- [113] Ross NL, Zhao J, Angel RJ (2004) High-pressure single-crystal X-ray diffraction study of YAlO<sub>3</sub> perovskite. *Journal of Solid State Chemistry* 177:1276-1284.
- [114] Sledobnick C, Zhao J, Angel RJ, Hanson BE, Song Y, Liu Z, Hemley R (2004) A high pressure study of Ru<sub>3</sub>(CO)<sub>12</sub> by X-ray diffraction, Raman, and infrared spectroscopy. *Inorganic Chemistry* 43:5245-5252.
- [115] Speziale S, Duffy T, Angel RJ (2004) Single crystal elasticity of fayalite to 12 GPa. *Journal of Geophysical Research* 10.1029/2004JB003162.
- [116] Zhao J, Ross NL, Angel RJ (2004) New view of the high-pressure behaviour of GdFeO<sub>3</sub>-type perovskites. *Acta Crystallographica B* 60:263-271.
- [117] Zhao J, Ross NL, Angel RJ (2004) Polyhedral control of the rhombohedral to cubic phase transition in LaAlO<sub>3</sub> perovskite. *Journal of Physics Condensed Matter* 16:8763-8773.
- [118] Zhao J, Ross NL, Angel RJ (2004) Tilting and distortion of perovskite structure CaSnO<sub>3</sub> from single-crystal X-ray diffraction study at high pressure up to 7 GPa. *Physics and Chemistry of Minerals* 19:299-305.
- [119] Angel RJ, Ross NL, Zhao J (2005) The compression of framework minerals: beyond rigid polyhedra. *European Journal of Mineralogy* 17:193-199.
- [120] Angel RJ, Zhao J, Ross NL (2005) General rules for predicting phase transitions in perovskites due to octahedral tilting. *Physical Review Letters* 95:025503.
- [121] Benusa M, Angel RJ, Ross NL (2005) Compression of albite, NaAlSi<sub>3</sub>O<sub>8</sub>. *American Mineralogist* 90:1115-1120.
- [122] Bujak M, Angel RJ (2005) Single crystal X-ray diffraction studies on [(CH<sub>3</sub>)<sub>n</sub>NH<sub>4-n</sub>]<sub>3</sub>[Sb<sub>2</sub>Cl<sub>9</sub>] (n = 2, 3) chloroantimonates(III) in their low-temperature ferroelectric phases - structures and phase transitions. *Journal of Solid State Chemistry* 178:2237-2246.
- [123] Fan J, Sledobnick C, Angel RJ, Hanson BE (2005) New zinc phosphates decorated by imidazole-containing ligands. *Inorganic Chemistry* 44:552-558.
- [124] Fan J, Sledobnick C, Troya D, Angel RJ, Hanson BE (2005) Five new zinc phosphite structures: tertiary building blocks in the construction of hybrid materials. *Inorganic Chemistry* 44:2719-2727.
- [125] Jacobsen SD, Lin J-F, Angel RJ, Shen G, Prakapenka V, Dera P, Mao H-K, Hemley RJ (2005) Single-crystal synchrotron X-ray diffraction study of wüstite and magnesiowüstite at lower-mantle pressures. *Journal of Synchrotron Radiation* 12:577-583.
- [126] Van Aken PA, Mieke G, Woodland AB, Angel RJ (2005) Crystal structure and cation distribution in Fe<sub>7</sub>SiO<sub>10</sub> ("Iscorite"). *European Journal of Mineralogy* 17:723-731.
- [127] Brown JM, Abramson EH, Angel RJ (2006) Triclinic elastic constants for low albite. *Physics and Chemistry of Minerals* 33:256-265.



- [128] Bujak M, Angel RJ (2006) High pressure and low temperature induced changes in  $[(\text{CH}_3)_2\text{NH}(\text{CH}_2)_2\text{NH}_3][\text{SbCl}_5]$ . *Journal of Physical Chemistry, part B* 110:10322-10331.
- [129] Burt J, Ross NL, Angel RJ, Koch M (2006) Equations of state and structures of andalusite and sillimanite to 10 GPa. *American Mineralogist* 91:319-326.
- [130] Vanpeteghem CB, Angel RJ, Ross NL, Jacobsen SD, Litasov KD, Ohtani E (2006) Al, Fe substitution in  $\text{MgSiO}_3$  perovskite structure: a single X-ray diffraction study. *Physics of Earth and Planetary Interiors* 155:96-103.
- [131] Vanpeteghem CB, Zhao J, Angel RJ, Ross NL, Bolfan-Casanova N (2006) Crystal structure and equation of state of  $\text{MgSiO}_3$  perovskite. *Geophysical Research Letters* 33:L03306, doi:10.1029/2005GL024955.
- [132] Zhao J, Ross NL, Angel RJ (2006) Structural evolutions of perovskites under high pressure and high temperature (in chinese). *Wuli (Physics)* 35:461-465.
- [133] Zhao J, Ross NL, Angel RJ (2006) Estimation of polyhedral compressibility and tilting in  $\text{GdFeO}_3$ -type perovskites through compression of unit-cell axes. *Acta Crystallographica B* 62:431-439.
- [134] Angel RJ, Bujak M, Zhao J, Gatta GD, Jacobsen SD (2007) Effective hydrostatic limits of pressure media for high-pressure crystallographic studies. *Journal of Applied Crystallography* 40:26-32.
- [135] Angel RJ, Zhao J, Ross NL, Jakeways CV, Redfern SAT, Berkowski M (2007) High-pressure structural evolution of a perovskite solid solution  $(\text{La}_{1-x}\text{Nd}_x)\text{GaO}_3$ . *Journal of Solid State Chemistry* 180:3408-3424.
- [136] Bujak M, Angel RJ (2007) Low-temperature single crystal X-ray diffraction and high-pressure Raman studies on  $[(\text{CH}_3)_2\text{NH}_2]_2[\text{SbCl}_5]$ . *Journal of Solid State Chemistry* 180:3026-3034.
- [137] Gatta GD, Angel RJ (2007) Elastic behavior and pressure-induced structural evolution of nepheline: implications for the nature of the modulated superstructure. *American Mineralogist* 92:1446-1455.
- [138] Angel RJ, Gatta GD, Boffa-Ballaran T, Carpenter MA (2008) The mechanism of coupling in the modulated structure of nepheline. *Canadian Mineralogist* 46:1465-1476.
- [139] Detrie TA, Ross NL, Angel RJ, Welch MD (2008) Crystal chemistry and location of hydrogen atoms in prehnite. *Mineralogical Magazine* 72:1163-1180.
- [140] Jani D, Nagarkatti R, Beatty W, Angel RJ, Slebodnick C, Anderson J, Iannaccone G, Kumar S, Rathore D (2008) HDP, A novel heme detoxification protein from the malaria parasite. *PLoS Pathogens* 4:e1000053.
- [141] Mihailova B, Angel R, Welsch A-M, Zhao J, Engel J, Paulmann C, Gospodinov M, Ashbabs H, Stosch R, Guettler B, Bismayer U (2008) Pressure-induced phase transition in  $\text{PbSc}_{0.5}\text{Ta}_{0.5}\text{O}_3$  as a model Pb-based perovskite-type relaxor ferroelectric. *Physical Review Letters* 101:017602.
- [142] Nestola F, Curetti N, Benna P, Ivaldi G, Angel RJ, Bruno E (2008) Compressibility and high-pressure behaviour of  $\text{Ab}_{63}\text{Or}_{27}\text{An}_{10}$  anorthoclase. *Canadian Mineralogist* 46:1433-1454.

- [143] Nestola F, Nemeth P, Angel R, Buseck P (2008) Equation of state and crystal structure of the new germanate post-titanite phase. *American Mineralogist* 93:1424-1428.
- [144] Slebodnick C, Angel R, Hanson B, Agaskar P, Soler T, Falvello L (2008) Disorder and pseudo-symmetry in octakis(trivinylsilyl)octasilicate. *Acta Crystallographica B* 64:330-337.
- [145] Vanpeteghem C, Angel R, Zhao J, Ross N, Redhammer G, Seifert F (2008) The effect of oxygen vacancies and aluminium substitution on the high pressure properties of brownmillerite-structured  $\text{Ca}_2\text{Fe}_{2-x}\text{Al}_x\text{O}_5$ . *Physics and Chemistry of Minerals* 35:493-504.
- [146] Yan J, Adams P, Angel RJ, Ross NL, Rivers M, Parise J, Clarke S (2008) The development of an automated data analysis system for high-pressure powder diffraction data collected using an area detector. *High Pressure Research* 28:293-298.
- [147] Angel RJ, Jackson JM, Reichmann HJ, Speziale S (2009) Elasticity measurements on minerals: a review. *European Journal of Mineralogy* 21:525-550.
- [148] Camara F, Nestola F, Angel RJ, Ohashi H (2009) Spontaneous strain variations through the low temperature displacive phase transition of  $\text{LiGaSi}_2\text{O}_6$  clinopyroxene. *European Journal of Mineralogy* 21:599-614.
- [149] Detrie TA, Ross NL, Angel RJ, Gatta GD (2009) Equation of state and structure of prehnite to 9.8 GPa. *European Journal of Mineralogy* 21:561-570.
- [150] Spencer EC, Angel RJ, Ross NL, Hanson BE, Howard JAK (2009) Pressure-induced cooperative bond rearrangement in a zinc imidazolate framework: a high-pressure single-crystal X-ray diffraction study. *Journal of the American Chemical Society* 131:4022-4026.
- [151] Welsch A-M, Maier BJ, Engel JM, Mihailova B, Angel RJ, Paulmann C, Gospodinov M, Friedrich A, Stosch R, Güttler B, Petrova D, Bismayer U (2009) Effect of Ba-incorporation on pressure-induced structural changes in the relaxor ferroelectric  $\text{PbSc}_{0.5}\text{Ta}_{0.5}\text{O}_3$ . *Physical Review B* 80:104118/1-7
- [152] Zhao J, Ross NL, Angel RJ, Carpenter MA, Howard CJ, Pawlak DA, Lukasiewicz (2009) High-pressure crystallography of rhombohedral  $\text{PrAlO}_3$  perovskite. *Journal of Physics: Condensed Matter* 21:235403.
- [153] Gatta GD, Angel RJ, Carpenter MA (2010) Low-temperature behaviour of natural kalsilite with P31c symmetry: an in-situ single-crystal X-ray diffraction study. *American Mineralogist* 95:1027-1034.
- [154] Halasz I, Dinnebier RE, Angel RJ (2010) Parametric Rietveld refinement for the evaluation of powder diffraction patterns collected as a function of pressure. *Journal of Applied Crystallography* 43:504-510.
- [155] Maier BJ, Angel RJ, Marshall WG, Mihailova B, Paulmann C, Engel JM, Gospodinov M, Welsch A-M, Petrova D, Bismayer U (2010) Octahedral tilting in Pb-based relaxor ferroelectrics at high pressure. *Acta Crystallographica B* 66:280-291.
- [156] Maier BJ, Welsch A-M, Angel RJ, Mihailova B, Zhao J, Engel JM, Schmitt LA, Paulmann C, Gospodinov M, Friedrich A, Bismayer U (2010) A-site doping-induced renormalization of structural transformations in the  $\text{PbSc}_{0.5}\text{Nb}_{0.5}\text{O}_3$  relaxor ferroelectric under high pressure. *Physical Review B* 81:174116.

- [157] Nestola F, Angel RJ, Zhao J, Garrido CJ, Sánchez-Vizcaín VL, Capitani G, Mellini M (2010) Antigorite equation of state and anomalous softening at 6 GPa: an in-situ single-crystal X-ray diffraction study. *Contributions to Mineralogy and Petrology* 160:33-43.
- [158] Nestola F, Boffa-Ballaran T, Angel RJ, Zhao J, Ohashi H (2010) High-pressure behavior of Ca/Na clinopyroxenes: the effect of divalent and trivalent 3d-transition elements. *American Mineralogist* 95:832-838.
- [159] Rinaldi R, Gatta GD, Angel RJ (2010) Crystal chemistry and low-temperature behaviour of datolite: a single-crystal X-ray diffraction study. *American Mineralogist* 95:1431-1421.
- [160] Sochalski-Kolbus L, Angel RJ, Nestola F (2010) The effect of Al,Si disorder on the bulk moduli of plagioclase feldspars. *Mineralogical Magazine* 74:943-950.
- [161] Tribaudino M, Angel RJ, Camara F, Nestola F, Pasqual D, Margiolaki I (2010) Thermal expansion of plagioclase feldspars. *Contributions to Mineralogy and Petrology* 160:899-908.
- [162] Yu Y, Wentzcovitch RM, Angel RJ (2010) First principles study of the thermodynamics and phase transition in low-pressure ( $P2_1/c$ ) and high-pressure ( $C2/c$ ) clinoenstatite  $MgSiO_3$ . *Journal of Geophysical Research* 115:B02201, doi:10.1029/2009JB006329.
- [163] Zhao J, Angel RJ, Ross NL (2010) Effects of deviatoric stresses in the diamond-anvil pressure cell on single crystal samples. *Journal of Applied Crystallography* 43:743-751.
- [164] Angel RJ, Finger LW (2011) SINGLE: a program to control single-crystal diffractometers. *Journal of Applied Crystallography* 44:247-251.
- [165] Curetti N, Sochalski-Kolbus L, Angel RJ, Benna P, Nestola F, Bruno E (2011) High-pressure structural evolution and equation of state of analbite. *American Mineralogist* 96:383-392.
- [166] Gatta GD, Angel RJ, Zhao J, Alvaro M, Rotiroti N, Carpenter MA (2011) Phase-stability, elastic behavior and pressure-induced structural evolution of kalsilite: a ceramic material and high-T/high-P mineral. *American Mineralogist* 96:1363-1372
- [167] Maier BJ, Angel RJ, Mihailova B, Marshall WG, Gospodinov M, Bismayer U (2011) High pressure powder neutron diffraction study on lead scandium niobate. *Journal of Physics C: Condensed Matter* 23:035902.
- [168] Maier BJ, Waeselmann N, Mihailova B, Angel RJ, Ederer C, Paulmann C, Gospodinov M, Friedrich A, Bismayer U (2011) Structural state of relaxor ferroelectrics  $PbSc_{0.5}Ta_{0.5}O_3$  and  $PbSc_{0.5}Nb_{0.5}O_3$  at high pressures up to 30 GPa. *Physical Review B* 84:174104
- [169] Maier BJ, Welsch A-M, Mihailova B, Angel RJ, Zhao J, Paulmann C, Engel JM, Marshall WG, Gospodinov M, Petrova D, Bismayer U (2011) Effect of La doping on the ferroic order in Pb-based perovskite-type relaxor ferroelectrics. *Physical Review B* 83:134106

- [170] Mihailova B, Angel RJ, Maier BJ, Welsch A-M, Zhao J, Gospodinov M, Bismayer U (2011) The structural state of lead-based relaxor ferroelectrics under pressure. *Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* 58:1905-1913.
- [171] Periotto B, Nestola F, Balic-Zunic T, Angel RJ, Miletich R, Olsen LA (2011) Comparison between beryllium and diamond backing plates diamond anvil cells: application to single-crystal X-ray diffraction high-pressure data. *Review of Scientific Instruments* 82:055111
- [172] Sieglar MA, Parkin S, Angel RJ, Brock CP (2011) Detailed Study of the Phase Transition in  $[\text{Ni}(\text{H}_2\text{O})_6](\text{NO}_3)_2 \cdot (15\text{-crown-5}) \cdot \text{H}_2\text{O}$ , and Analysis in Terms of Mean-Field Theory. *Acta Crystallographica B* 67:130-143.
- [173] Tribaudino M, Bruno M, Nestola F, Pasqual D, Angel RJ (2011) Thermoelastic and thermodynamic properties of plagioclase feldspars from thermal expansion measurements. *American Mineralogist* 96:992-1002.
- [174] Wang D, Angel RJ (2011) Octahedral tilts, symmetry-adapted modes and polyhedral volume ratios in perovskite structures. *Acta Crystallographica B* 67:302-314.
- [175] Welsch A-M, Maier BJ, Mihailova B, Angel RJ, Zhao J, Paulmann C, Engel JM, Gospodinov M, Marinova V, Bismayer U (2011) Transformation processes in relaxor ferroelectric  $\text{PbSc}_{0.5}\text{Ta}_{0.5}\text{O}_3$  heavily doped with Nb and Sn. *Zeitschrift für Kristallographie* 226:126-137.
- [176] Yu Y, Wentzcovitch R, Vinograd V, Angel RJ (2011) Thermodynamic properties of  $\text{MgSiO}_3$  majorite and phase transitions near 660-km depth in  $\text{MgSiO}_3$  and  $\text{Mg}_2\text{SiO}_4$ : a first principles study. *Journal of Geophysical Research* 116:B02208.
- [177] Zhao J, Angel RJ, Ross NL (2011) The structural variation of rhombohedral  $\text{LaAlO}_3$  perovskite under non-hydrostatic stress fields in a diamond-anvil cell. *Journal of Physics C: Condensed Matter* 23, 175901.
- [178] Zhao J, Ross NL, Wang D, Angel RJ (2011) High-pressure crystal structure of elastically isotropic  $\text{CaTiO}_3$  perovskite under hydrostatic and non-hydrostatic conditions. *Journal of Physics C: Condensed Matter*, 23:455401.
- [179] Alvaro M, Angel RJ, Camara F (2012) High-pressure behaviour of zoisite. *American Mineralogist* 97:1165-1176.
- [180] Angel RJ, Beirau T, Mihailova B, Paulmann C, Bismayer U (2012) The role of lone pairs in the ferroelastic phase transition in the palmierite-type lead phosphate-arsenate solid solution. *Zeitschrift für Kristallographie* 227:585-593.
- [181] Angel RJ, Sochalski-Kolbus LM, Tribaudino M (2012) Tilts and tetrahedra: the origin of anisotropy of feldspars. *American Mineralogist* 97:765-778.
- [182] Gibbs GV, Wang D, Hin C, Ross NL, Cox D, Crawford D, Spackman M, Angel RJ (2012) Properties of atoms under pressure: Bonded interactions of the atoms in three perovskites. *Journal of Chemical Physics*, 137:164313
- [183] Periotto B, Balic-Zunic T, Nestola F, Katerinopoulou A, Angel RJ (2012) Re-investigation of the crystal structure of enstatite under high-pressure conditions. . *American Mineralogist*, 97:1741-1748.

- [184] Spencer, EC, Ross, NL, and Angel, RJ (2012) The high-pressure behaviour of the 3d copper carbonate framework  $\{[\text{Cu}(\text{CO}_3)_2](\text{CH}_6\text{N}_3)_2\}_n$ . *Journal of Materials Chemistry*, 22, 2074-2080.
- [185] Tribaudino M, Angel RJ (2012) The thermodynamics of the I-1 - P-1 phase transition in Ca-rich plagioclase from an assessment of the spontaneous strain. *Physics and Chemistry of Minerals* 39:699-712.
- [186] Waesermann N, Maier BJ, Mihailova B, Angel RJ, Zhao J, Gospodinov M, Paulmann C, Ross NL, Bismayer U (2012) Pressure-induced structural transformations in pure and Ru-doped  $0.9\text{PbZn}_{1/3}\text{Nb}_{2/3}\text{O}_3-0.1\text{PbTiO}_3$  near the morphotropic phase boundary. *Physical Review B* 85:014106-1-10.
- [187] Woodland AB, Angel RJ, Koch M (2012) Structural systematics of spinel and spinelloid phases in the system  $\text{MFe}_2\text{O}_4-\text{M}_2\text{SiO}_4$  with  $\text{M} = \text{Fe}^{2+}$  and Mg. *European Journal of Mineralogy* 24:657-668.
- [188] Angel RJ, Gonzalez-Platas J (2013) Absorb7 and Absorb-GUI for single-crystal absorption corrections. *Journal of Applied Crystallography*, 46:252-254.
- [189] Angel R.J., Ross N.L., Zhao J., Sochalski-Kolbus L.M., Krüger H., Schmidt B.C. (2013): Structural controls on the anisotropy of tetrahedral frameworks: the example of monoclinic feldspars. *European Journal of Mineralogy* 25:597-614.
- [190] Bartoli O, Cesare B, Poli S, Acosta-Vigil A, Esposito R, Turina A, Bodnar RJ, Angel RJ, Hunter J (2013) Nanogranite inclusions in migmatitic garnet: behavior during piston cylinder re-melting experiments. *Geofluids*, 13:405-420.
- [191] Marquardt H, Waesermann N, Wehber M, Angel RJ, Gospodinov M, Mihailova B (2013) High-pressure Brillouin scattering of single-crystal  $\text{PbSc}_{1/2}\text{Ta}_{1/2}\text{O}_3$  relaxor ferroelectric. *Physical Review B*, 87:184113
- [192] Mihailova B, Waesermann N, Maier BJ, Angel RJ, Prussmann T, Paulmann C, Gospodinov M, Bismayer U (2013) Chemically-induced renormalization phenomena in Pb-based relaxor ferroelectrics under high pressure. *Journal of Physics C: Condensed Matter*, 25:115403.
- [193] Mihailova B, Waesermann N, Maier BJ, Welsch A-M, Angel RJ, Bismayer U (2013) Pressure-induced structural transformations in advanced ferroelectrics with relaxor behaviour. *High Pressure Research* 33:595-606.
- [194] Periotto B, Angel RJ, Nestola F, Balic-Zunic T, Fontana C, Pasqual D, Alvaro M, Redhammer GR (2013) High-pressure X-ray study of  $\text{LiCrSi}_2\text{O}_6$  clinopyroxene and the general compressibility trend for Li-clinopyroxenes. *Physics and Chemistry of Minerals*, 40:387-399.
- [195] Woodland AB, Schollenbruch K, Koch M, Boffa-Ballaran T, Angel RJ, Frost DJ (2013)  $\text{Fe}_4\text{O}_5$  and its solid solutions in several simple systems. *Contributions to Mineralogy and Petrology* 166:1677-1686.
- [196] Yu Y, Angel RJ, Ross NL, Gibbs GV (2013) Pressure impact on the structure, elasticity, and electron density distribution of  $\text{CaSi}_2\text{O}_5$ . *Physical Review B* 87:184112.
- [197] Angel RJ, Gonzalez-Platas J, Alvaro M (2014) EosFit-7c and a Fortran module (library) for equation of state calculations. *Zeitschrift für Kristallographie*, 229, 405-419.

- [198] Angel RJ, Mazzucchelli ML, Alvaro M, Nimis P, Nestola F (2014) Geobarometry from host-inclusion systems: the role of elastic relaxation. *American Mineralogist*, 99:2146-2149.
- [199] Nestola F, Nimis P, Angel RJ, Milani S, Bruno M, Prencipe M, Harris, JW (2014) Olivine with diamond-imposed morphology included in diamonds. Syngensis or protogenesis? *International Geology Review* 56:1658-1667.
- [200] Valentini L, Parisatto M, Russo V, Ferrari G, Bullard JW, Angel RJ, Dalconi MC, Artioli G (2014) Simulation of the hydration kinetics and elastic moduli of cement mortars by microstructural modelling. *Cement and Concrete Composites*, 52:54-63.
- [201] Alvaro M, Angel RJ, Marciano C, Milani S, Scandolo L, Mazzucchelli ML, Zaffiro G, Rustioni G, Briccola M, Domeneghetti CM, Nestola F (2015) A new micro-furnace for "in situ" high-temperature single crystal X-ray diffraction measurements. *Journal of Applied Crystallography* 48:1192-1200.
- [202] Angel RJ, Alvaro M, Nestola F, Mazzucchelli ML (2015) Diamond thermoelastic properties and implications for determining the pressure of formation of diamond-inclusion systems. *Russian Geology and Geophysics* 56:211-220.
- [203] Angel RJ, Milani S, Alvaro M, Nestola F (2015) OrientXplot – a program to analyse and display relative crystal orientations. *Journal of Applied Crystallography* 48:1330-1334.
- [204] Angel RJ, Nimis P, Mazzucchelli ML, Alvaro M, Nestola F (2015) How large are departures from lithostatic pressure? Constraints from host-inclusion elasticity. *Journal of Metamorphic Geology* 33:801-813.
- [205] Mihailova B, Angel RJ, Waeselmann N, Maier BJ, Paulmann C, Bismayer U (2015) Pressure-induced transformation processes in ferroelastic  $\text{Pb}_3(\text{P}_{1-x}\text{As}_x\text{O}_4)_2$ ,  $x = 0$  and  $0.80$ . *Zeitschrift für Kristallographie* 230:593-603.
- [206] Brown JM, Angel RJ, Ross NL (2016) Elasticity of plagioclase feldspars. *Journal of Geophysical Research: Solid Earth* 121:663-675.
- [207] Ferrero S, Ziemann MA, Angel RJ, O'Brien PJ, Wunder B (2016) Kumdykolite, kokchetavite, and cristobalite crystallized in nanogranites from felsic granulites, Orlica-Snieznik Dome (Bohemian Massif): not evidence for ultrahigh pressure conditions. *Contributions to Mineralogy and Petrology* 171:3.
- [208] Angel RJ, Nestola F (2016) A century of mineral structures: how well do we know them? *American Mineralogist*, 101:1036-1045.
- [209] Biedermann AR, Pettke T, Angel RJ, Hirt AM (2016) Anisotropy of magnetic susceptibility in alkali feldspar and plagioclase. *Geophysical Journal International*, 205:479-489.
- [210] Waeselmann N, Brown JM, Angel RJ, Ross NL, Zhao J, Kaminski W (2016) The elastic tensor of monoclinic alkali feldspars. *American Mineralogist*, 101:1228-1231.
- [211] Gonzalez-Platas J, Alvaro M, Nestola F, Angel RJ (2016) EosFit7-GUI: A new GUI tool for equation of state calculations, analyses, and teaching. *Journal of Applied Crystallography* 49:1377-1382 doi:10.1107/S1600576716008050

- [212] Angel RJ, Milani S, Alvaro M, Nestola F (2016) High quality structures at high pressure? Insights from inclusions in diamonds. *Zeitschrift für Kristallographie* 231:467-473.
- [213] Nimis P, Alvaro M, Nestola F, Angel RJ, Marquardt K, Rustioni G, Harris JW (2016) First evidence of hydrous silicic fluid films around solid inclusions in gem-quality diamonds. *Lithos*, 260:384-389.
- [214] Aguirrechu-Comerón A, Hernández-Molina R, Rodríguez-Hernández P, Muñoz A, Rodríguez-Mendoza UR, della Ventura VL, Angel RJ, Gonzalez-Platas J (2016) An experimental and ab initio study of catena(bis( $\mu$ 2-iodo)-6-methylquinoline-copper(I)) under pressure: Synthesis, crystal structure, electronic and luminescence properties *Inorganic Chemistry* 55:7476-7484.
- [215] Milani S, Nestola F, Angel RJ, Nimis P, Harris J (2016) Crystallographic orientations of olivine inclusions in diamonds. *Lithos* 265:312-316.
- [216] Scheidl K, Kurnosov A, Trots DM, Boffa-Ballaran T, Angel RJ, Miletich R (2016) Extending the single-crystal quartz pressure gauge to hydrostatic pressures of 19 GPa. *Journal of Applied Crystallography*, 49:2129-2137.
- [217] Anzolini C, Angel RJ, Merlini M, Derzsi M, Tokár K, Milani S, Krebs MY, Brenker FE, Nestola F, Harris JW (2016) Depth of formation of CaSiO<sub>3</sub>-walsstromite included in super-deep diamonds. *Lithos*, 265:138-147.
- [218] Milani S, Angel RJ, Scandolo L, Mazzucchelli ML, Boffa-Ballaran T, Klemme S, Domeneghetti MC, Miletich R, Scheidl KS, Derzsi M, Tokar K, Prencipe M, Alvaro M, Nestola F (2017) Thermo-elastic behaviour of grossular garnets at high pressures and temperatures. *American Mineralogist*, 102:851-859.
- [219] Angel RJ, Alvaro M, Miletich R, Nestola F (2017) A simple and generalised P-T-V Eos for structural phase transitions, implemented in EosFit and applied to quartz. *Contributions to Mineralogy and Petrology*, 172:29.
- [220] Fischer M, Angel RJ (2017) Accurate structures and energetics of neutral-framework zeotypes from dispersion-corrected DFT calculations. *Journal of Chemical Physics*, 146:174111.
- [221] Bismayer U, Mihailova B, Angel RJ (2017) Ferroelasticity in palmierite-type (1-x)Pb<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> - xPb<sub>3</sub>(AsO<sub>4</sub>)<sub>2</sub>. *Journal of Physics C: Condensed Matter* 29:213001.
- [222] Angel RJ, Mazzucchelli ML, Alvaro M, Nestola F (2017) EosFit-Pinc: A simple GUI for host-inclusion elastic thermobarometry. *American Mineralogist* 102:1957-1960.
- [223] Angel RJ, Alvaro M, Nestola F (2018) 40 years of mineral elasticity: a critical review and a new parameterisation of Equations of State for mantle olivines and diamond inclusions. *Physics and Chemistry of Minerals* 45:95-113. DOI: 10.1007/s00269-017-0900-7
- [224] Campomenosi N, Mazzucchelli ML, Mihailova B, Scambelluri M, Angel RJ, Nestola F, Reali A, Alvaro M (2018) How geometry and anisotropy affect residual strain in host inclusion system: coupling experimental and numerical approaches. *American Mineralogist*, 103:2032-2035.
- [225] Ferrero S, Angel RJ (2018) Micropetrology: are inclusions grains of truth? *Journal of Petrology* 59:1671-1700.

- [226] Mazzucchelli ML, Burnley P, Angel RJ, Morganti S, Domeneghetti MC, Nestola F, Alvaro M (2018) Elastic geothermobarometry: corrections for the geometry of the host-inclusion system. *Geology* 46:231-234.
- [227] Murri M, Mazzucchelli ML, Campomenosi N, Korsakov AV, Prencipe M, Mihailova B, Scambelluri M, Angel RJ, Alvaro M (2018) Raman elastic geobarometry for anisotropic mineral inclusions. *American Mineralogist* 103:1869-1872.
- [228] Papa S, Pennacchioni G, Angel RJ, Faccenda M (2018) The fate of garnet during (deep-seated) coseismic frictional heating: The role of thermal shock. *Geology* 46:471-474.
- [229] Pina-Binvignat FA, Malcherek T, Angel RJ, Paulmann C, Schlüter J, Mihailova B (2018) Radiation-damaged zircon under high pressures. *Physics and Chemistry of Minerals* 45: 981-993.
- [230] Angel RJ, Murri M, Mihailova B, Alvaro M (2019) Stress, strain and Raman shifts. *Zeitschrift für Kristallographie*, 234:129-140
- [231] Murri M, Alvaro M, Angel RJ, Prencipe M, Mihailova BD (2019) The effects of non-hydrostatic stress on the structure and properties of alpha-quartz. *Physics and Chemistry of Minerals*, 46:487-499.
- [232] Nimis P, Angel RJ, Alvaro M, Nestola F, Harris JW, Casati N, Marone F (2019) Crystallographic orientations of magnesiochromite inclusions in diamonds: what do they tell us? *Contributions to Mineralogy and Petrology* 174:29.
- [233] Mihailova B, Waesermann N, Stangarone C, Angel RJ, Prencipe M, Alvaro M (2019) The pressure-induced phase transition(s) of ZrSiO<sub>4</sub>: revised. *Physics and Chemistry of Minerals* 46:807-814.
- [234] Stangarone C, Angel R, Prencipe M, Campomenosi N, Mihailova BD, Alvaro M (2019) Measurement of strains in zircon inclusions by Raman spectroscopy. *European Journal of Mineralogy* 31:685-694.
- [235] Stangarone C, Angel RJ, Prencipe M, Mihailova BD, Alvaro M (2019) New insights into the zircon-reidite phase transition. *American Mineralogist* 104:830-837.
- [236] Zaffiro G, Angel RJ, Alvaro M (2019) Constraints on the Equations of State of stiff anisotropic minerals: rutile, and the implications for rutile elastic barometry. *Mineralogical Magazine* 83:339-347.
- [237] Bonazzi M, Tumati S, Thomas J, Angel RJ, Alvaro M (2019) Assessment of the reliability of elastic geobarometry with quartz inclusions. *Lithos* 350-351:105201.
- [238] Mazzucchelli ML, Reali A, Morganti S, Angel RJ, Alvaro M (2019) Elastic geobarometry for anisotropic inclusions in cubic hosts. *Lithos* 350-351:105218.
- [239] Angel RJ, Miozzi F, Alvaro M (2019) Are thermal-pressure equations of state valid? *Minerals* 9:562.
- [240] Campomenosi N, Mazzucchelli ML, Mihailova B, Angel RJ, Alvaro M (2020) Using polarized Raman spectroscopy to study the stress gradient in mineral systems with anomalous birefringence. *Contributions to Mineralogy and Petrology* 175:16.
- [241] Morana M, Mihailova B, Angel RJ, Alvaro M (2020) Quartz metastability at high pressure: what new can we learn from polarized Raman spectroscopy? *Physics and Chemistry of Minerals* 47:34.



- [242] Angel RJ, Alvaro M, Schmid-Beurmann P, Kroll H (2020) Commentary on ‘Constraints on the Equations of State of stiff anisotropic minerals: rutile, and the implications for rutile elastic barometry’. *Mineralogical Magazine* 84:339-347.
- [243] Alvaro M, Mazzucchelli ML, Angel RJ, Murri M, Campomenosi N, Scambelluri M, Nestola F, Korsakov AV, Tomilenko AA, Marone F, Morana M (2020) Fossil subduction recorded by quartz from the coesite stability field. *Geology* 48:24-28.
- [244] Angel RJ, Mazzucchelli ML, Alvaro M, Nestola F (2020) Response to the discussion by Zhong et al. of ‘EosFit-Pinc: a simple GUI for host-inclusion elastic thermobarometry’. *American Mineralogist* 105:1587-1588.
- [245] Campomenosi N, Scambelluri M, Angel RJ, Hermann J, Mazzucchelli ML, Mihailova B, Piccoli F, Alvaro M (2021) Using the elastic properties of zircon-garnet host-inclusion pairs for thermobarometry of the ultrahigh-pressure Dora-Maira whiteschists: problems and perspectives. *Contributions to Mineralogy and Petrology* 176:36.
- [246] Musiyachenko KA, Murri M, Prencipe M, Angel RJ, Alvaro M (2021) A new Grüneisen tensor for rutile and its application to host-inclusion systems. *American Mineralogist* 106: 1586-1595.
- [247] Mazzucchelli ML, Angel RJ, Alvaro M (2021) EntraPT: an online platform for elastic geothermobarometry. *American Mineralogist* 106:829-836.
- [248] Gilio M, Angel RJ, Alvaro M (2021) Elastic geobarometry: how to work with residual inclusion strains and pressures. *American Mineralogist* 106:1530-1533.
- [249] Gonzalez JP, Mazzucchelli ML, Angel RJ, Alvaro M (2021) Elastic geobarometry for anisotropic inclusions in anisotropic host minerals: quartz-in-zircon. *Journal of Geophysical Research Solid Earth* 126: e2021JB022080
- [250] Angel RJ, Mazzucchelli ML, Gonzalez-Platas J (2021) A self-consistent approach to describe unit-cell parameter and volume variations with pressure and temperature *Journal of Applied Crystallography* 54:1621-1630
- [251] Ehlers AM, Zaffiro G, Angel RJ, Boffa-Ballaran T, Carpenter MA, Alvaro M, Ross NL (2022) Thermoelastic properties of zircon: implications for geothermobarometry. *American Mineralogist* 107:74-81.
- [252] Alvaro M, Angel RJ, Nestola F (2022) Inclusions in diamonds probe Earth’s chemistry through deep time. *Communications Chemistry* 5:10.
- [253] Osborne ZR, Thomas JB, Nachlas WO, Angel RJ, Hoff CM, Watson B (2022) TitaniQ revisited: expanded and improved Ti-in-quartz solubility model for thermobarometry. *Contributions to Mineralogy and Petrology* 177:31.
- [254] Murri M, Gonzalez JP, Mazzucchelli ML, Prencipe M, Mihailova B, Angel RJ, Alvaro M (2022) The role of symmetry-breaking strains on quartz inclusions in anisotropic hosts: implications for Raman elastic geobarometry *Lithos* 422-423:106716
- [255] Angel RJ, Gilio M, Mazzucchelli ML, Alvaro M (2022) Garnet EoS: a critical review and synthesis. *Contributions to Mineralogy and Petrology* 177:54

- [256] Gilio M, Scambelluri M, Angel RJ, Alvaro M (2022) The contribution of elastic geobarometry to the debate on HP vs. UHP metamorphism. *Journal of Metamorphic Geology* 40:229-24.
- [257] Angel RJ, Alvaro M, Nestola F (2022) Crystallographic methods for non-destructive characterization of mineral inclusions in diamonds. In K Smit, et al. (eds.), *Diamond: Genesis, Mineralogy and Geochemistry*, MSA: Washington DC. pp. 257-306, *Reviews in Mineralogy and Geochemistry*, vol. 88
- [258] Hagiwara Y, Angel RJ, Yamamoto J, Alvaro M (2022) Equation of state of spinel (MgAl<sub>2</sub>O<sub>4</sub>): Constraints on self-consistent thermodynamic parameters and implications for elastic geobarometry of peridotites and chromitites. *Contributions to Mineralogy and Petrology* 177:108.
- [259] Angel RJ, Mazzucchelli ML, Musiyachenko KA, Nestola F, Alvaro M (2023) Elasticity of mixtures and implications for piezobarometry of mixed-phase inclusions. *European Journal of Mineralogy* 35:461-468.
- [260] Campomenosi N, Angel RJ, Alvaro M, Mihailova B (2023) Resetting of zircon inclusions in garnet: implications for elastic thermobarometry. *Geology* 51:23-27.
- [261] Campomenosi N, Angel RJ, Alvaro M, Mihailova B (2023) Quartz-in-garnet (QuiG) under pressure: insights from in situ Raman spectroscopy. *Contributions to Mineralogy and Petrology* 178:44.
- [262] Morana M, Angel RJ, Alvaro M, Mihailova B (2023) High-temperature behaviour of quartz-in-garnet system revealed by in situ Raman spectroscopy. *Physics and Chemistry of Minerals* 50:21.

#### **Journal articles in press:**

- [1] Gonzalez JP, Thomas JB, Mazzucchelli ML, Angel RJ, Alvaro M (2023) First evaluation of stiff-in-soft host-inclusion systems: experimental synthesis of zircon inclusions in quartz crystals. *Contributions to Mineralogy and Petrology*

#### **Journal articles submitted:**

- [1] Hagiwara Y, Angel RJ, Yamamoto J, Alvaro M (2023) Post-entrapment density modification of fluid inclusions by elastic deformation: Implications for fluid inclusion geobarometry of peridotites and phenocrysts. *American Mineralogist*

#### **Book chapters:**

- [1] Angel RJ (1994) Feldspars at high pressure. In I Parsons (ed.) *Feldspars and their Reactions*, Kluwer Academic Publishers: Dordrecht. pp. 271-312, NATO ASI, vol. C421.
- [2] Miletich R, Angel RJ (1999) Phase transitions and equations of state. In K Wright and R Catlow (eds.), *Microscopic processes in Minerals*. pp. 477-492, NATO Science Series, vol. C543.
- [3] Miletich R, Angel RJ (1999) Crystal structures at extremes of pressure and temperature. In K Wright and R Catlow (eds.), *Microscopic processes in Minerals*. pp. 1-18, NATO Science Series, vol. C543.

- [4] Angel RJ (2000) Equations of state. In RM Hazen and RT Downs (eds.), *High-temperature and high-pressure crystal chemistry*, MSA. pp. 35-60, Reviews in Mineralogy and Geochemistry, vol. 41.
- [5] Angel RJ (2000) High-pressure powder diffraction. In RE Dinnebier (ed.) *Structure determination and refinement from powder diffraction data*. pp. 209-228, Berichte aus Arbeitskreisen der Deutsche Gessellschaft für Kristallographie, vol. 9.
- [6] Angel RJ (2000) High-pressure structural phase transitions. In SAT Redfern and MA Carpenter (eds.), *Transformation Processes in Minerals*. pp. 85-104, Reviews in Mineralogy & Geochemistry, vol. 39.
- [7] Angel RJ, Downs RT, Finger LW (2000) High-pressure, high-temperature diffraction. In RM Hazen and RT Downs (eds.), *High-pressure and high-temperature crystal chemistry*, MSA. pp. 559-596, Reviews in Mineralogy and Geochemistry, vol. 41.
- [8] McCammon C, Becerro AI, Lauterbach S, Blaess U, Marion S, Langenhorst F, Angel RJ, Van Aken PA, Seifert F (2002) Oxygen vacancies in perovskite and related structures: implications for the lower mantle. In A Navrotsky, KR Poeppelmeier, and RM Wentzcovitch (eds.), *Materials Research Symposium Proceedings*. pp. 109-114, vol. 718
- [9] Angel RJ (2004) Some practical aspects of studying equations of state and structural phase transitions at high pressure. In A Katrusiak and PF McMillan (eds.), *High-pressure crystallography*, Kluwer Academic. pp. 21-36.
- [10] Angel RJ (2005) High-pressure structure determination and refinement by X-ray diffraction. In J Chen, Y Wang, TS Duffy, G Shen and LP Dobrzynetskaya (eds.), *Advances in High-Pressure Research for Geophysical Applications*, Elsevier.

#### **PhD Thesis:**

Angel RJ (1985) *The role of planar defects in phase transformation*. University of Cambridge.

#### **Other publications:**

- [1] Angel RJ (1994) 1993 Max Hey Medal - Acceptance. *Mineralogical Magazine* 58:519-521.
- [2] Angel RJ (1995) Experimental Mineralogy Petrology and Geochemistry Preface. *European Journal of Mineralogy* 7:859-859.
- [3] Jephcoat AP, Angel RJ, Onions RK (1996) Developments in high-pressure, high-temperature research and the study of the Earth's deep interior - Preface. *Philosophical Transactions of the Royal Society of London Series a-Mathematical Physical and Engineering Sciences* 354:1249-1249.
- [4] Angel RJ (1997) Mineralogy - The Earth's mantle remodelled. *Nature* 385:490-491.
- [5] Dingwell DB, Angel RJ (1997) EMPG-VI - Preface. *European Journal of Mineralogy* 9:243-243.

- [6] Shen AH, Reichmann HJ, Chen G, Angel RJ, Bassett WA, Spetzler H (1997) Gigahertz ultrasonic interferometry in a diamond anvil cell: P-wave velocities in periclase to 4.4 GPa and 207°C. In M Manghanni (ed.) *Properties of Earth and Planetary Materials at High Pressure and Temperature*. pp. 71-77, AGU Geophysical Monograph, vol. 101
- [7] Angel RJ (1998) *Silicon*, in *McGraw-Hill Yearbook of Science and Technology, 1999*, Weil, Felsenfeld, and Martin, Editors. McGraw-Hill.
- [8] Angel RJ (1999) *X-ray Diffraction*, in *Encyclopedia of Geochemistry*, Marshall and Fairbridge, Editors. Kluwer Academic Press.
- [9] Ross NL, Angel RJ, Kung J, Chaplin TD (2002) Elastic Properties of calcium oxide perovskites. *Materials Research Society Symposia Proceedings* 718:115-119
- [10] Angel RJ (2006) Presentation of the Mineralogical Society of America Award for 2005 to Tiziana Boffa-Ballaran. *American Mineralogist* 91:969-970.
- [11] Comodi P, Nestola F, Angel RJ (2009) HP-HT mineral physics: implications for geosciences. Preface *European Journal of Mineralogy* 21:523-524.
- [12] Angel RJ (2012) Acceptance of the Dana Medal of the Mineralogical Society of America for 2011. *American Mineralogist* 97:1011-1012.
- [13] Nestola F, Nimis P, Angel RJ (2012) Preface: Diamonds, the mantle petrologist's best friend. *European Journal of Mineralogy* 24:561-562.
- [14] Angel RJ, Bouvier P, Fabbiani F (2014) Preface- Special Issue on High Pressure. *Zeitschrift für Kristallographie* 229:VII.

**Edited special issues of journals:**

- [1] Angel RJ (1995) Papers from EMPG-V. *European Journal of Mineralogy* 7, part 4.
- [2] Jephcoat AP, Angel RJ, Onions RK (1996) Papers from Royal Society Discussion meeting on "Developments in high-pressure, high-temperature research and the study of the Earth's deep interior". *Philosophical Transactions of the Royal Society of London Series A-Mathematical Physical and Engineering Sciences* 354, issue 1711.
- [3] Dingwell DB, Angel RJ (1997) Papers from EMPG-VI. *European Journal of Mineralogy* 9, part 2.
- [4] Comodi P, Nestola F, Angel RJ (2009) HP-HT mineral physics: implications for geosciences. (Papers from the 2008 Brixen mineral physics workshop) *European Journal of Mineralogy* 21, part 3.
- [5] Nestola F, Nimis P, Angel RJ (2012) Diamonds, the mantle petrologist's best friend. (Papers from the 2011 International Diamond School in Brixen) *European Journal of Mineralogy* 24, part 4.
- [6] Angel RJ, Bouvier P, Fabbiani F (2014) High pressure crystallography. *Zeitschrift für Kristallographie* 229, parts 2 and 3.