

REFERENCES

- Abu-Eid R.M., Vaughan D.J., Witner M., and Burns R.G. (1973) Spectral data bearing on the oxidation states of Fe, Ti and Cr on Apollo 15 and Apollo 16 samples. Lunar Science IV, 1-3.
- Adams J.B. and McCord T.B. (1972) Optical evidence for average pyroxene composition of Apollo 15 samples. In The Apollo 15 Lunar Samples, 10-13.
- Agrell S.O., Agrell J.E., Arnold A.R., and Bristol C.C. (1973) Observations on glass from 15425, 15426, 15427. Lunar Science IV, 12-14.
- Ahrens T.J., O'Keefe J.D., and Gibbons R.V. (1973a) Shock compression of a recrystallized anorthositic rock from Apollo 15. Proc. Lunar Sci. Conf. 4th, 2575-2590.
- Ahrens T.J., O'Keefe J.D., and Gibbons R.V. (1973b) Shock compression of a recrystallized breccia from Apollo 15. Lunar science IV, 18-20.
- Albee A.L., Chodos A.A., and Gancarz A.J. (1972) Petrology of Apollo 15 sample 15086. In The Apollo 15 Lunar Samples, 20-25.
- Alexander E.C., Jr. and Kahl S.B. (1974) ^{40}Ar - ^{39}Ar studies of lunar breccias. Proc. Lunar Sci. Conf. 5th, 1353-1373.
- Alexander E.C., Davis P.K., and Lewis R.S. (1972) ^{40}Ar - ^{39}Ar dating of Apollo sample 15555. Science 175, 417-419.
- Alexander E.C., Jr., Davis P.K., Reynolds J.H., and Srinivasan B. (1973) Age, exposure history, and trace element composition of some Apollo 14 and 15 rocks as determined from rare gas analyses. Lunar Science IV, 27-29.
- Ali M.Z., Stroube W.B., James W.D., and Ehmann W.D. (1976) Compositional studies of impact generated glasses and core sample 60009. Lunar Science VII, 10-12.
- Allen R.O., Jovanovic S., and Reed G.W., Jr. (1973a) Geochemistry of primordial Pb, Bi, and Zn in Apollo 15 samples. Proc. Lunar Sci. Conf. 4th, 1169-1175.
- Allen R.O., Jr., Jovanovic S., and Reed G.W., Jr. (1973b) Primordial Pb in Apollo 15 samples. Lunar Science IV, 34-36.
- Alvarez R. (1975) Lunar and terrestrial sample photoconductivity. Proc. Lunar Sci. Conf. 6th, 3187-3197.

- Andersen C.A. and Hinthorne J.R. (1973) $^{207}\text{Pb}/^{206}\text{Pb}$ ages and REE abundances in returned lunar material by ion microprobe mass analysis. Lunar Science IV, 37-39.
- Anderson A.T. (1973) The texture and mineralogy of lunar peridotite, 15445,10. J. Geol. 81, 219-226.
- Arndt J., Engelhardt W. von, Gorzalez-Cabeza I., and Meier B. (1984a) Cooling history of Apollo 15 Green Glasses: implications for their formation. Lunar Planet. Sci. XV, 17-18.
- Arndt J., Engelhardt W. von, Gorzalez-Cabeza I., and Meier B. (1984b) Formation of Apollo 15 Green Glass beads. Proc. Lunar Planet. Sci. Conf. 15th, in press.
- Baedecker P.A., Chou C.-L., Grudewicz E.B., and Wasson J.T. (1973) Volatile and siderophile trace elements in Apollo 15 samples: Geochemical implications and characterization of the long-lived and short-lived extralunar materials. Proc. Lunar Sci. Conf. 4th, 1177-1195.
- Bailey N.G. and Ulrich G.E. (1975) Apollo 15 voice transcript. U.S.G.S. Report #USGS-GD-74-029.
- Baker M.B. and Herzberg C.T. (1980) Spinel cataclastes in 15445 and 72435: petrology and criteria for equilibrium. Proc. Lunar Planet. Sci. Conf. 11th, 535-553.
- Baldrige W.S., Miller F., Wang H., and Simmons G. (1972) Thermal expansion of Apollo lunar samples and Fairfax diabase. Proc. Lunar Sci. Conf. 3rd, 2599-2609.
- Banerjee S.K. and Mellema J.P. (1974) Lunar paleointensity from three Apollo 15 crystalline rocks using an A.R.M. method. Earth Planet. Sci. Lett. 23, 185-188.
- Banerjee S.K., Hoffman K.A., and Mellema J.P. (1972) Difficulties in separating the stable component of natural remanent magnetization in lunar rocks. In The Apollo 15 Lunar Samples, 420-424.
- Barker C. (1974) Composition of the gases associated with the magmas that produced rocks 15016 and 15065. Proc. Lunar Sci. Conf. 5th, 1737-1746.
- Barnes I.L., Garner E.L., Gramlich J.W., Machlan L.A., Moody J.R., Moore L.J., Murphy T.J., and Shields W.R. (1973) Isotopic abundance ratios and concentrations of selected elements in some Apollo 15 and 16 samples. Proc. Lunar Sci. Conf. 4th, 1197-1207.
- Basu A., McKay D.S., Moore C.H., and Shaffer N.R. (1979) A note on the Apollo 15 green glass vitrophyres. Proc. Lunar Planet. Sci. Conf. 10th, 301-310.

- Becker R.H. and Clayton R.N. (1975) Nitrogen abundances and isotopic compositions in lunar samples. Proc. Lunar Sci. Conf. 6th, 2131-21
- Behrmann C., Crozaz G., Drozd R., Hohenberg C.M., Ralston C., Walker R.M., and Yuhas D. (1972) Rare gas and particle track studies of Apollo 15 samples: Hadley Rille and special soils. In The Apollo 15 Lunar Samples, 329-332.
- Bell P.M. and Mao H.K. (1972a) Zoned olivine crystals in an Apollo 15 lunar rock. In The Apollo 15 Lunar Samples, 26-28.
- Bell P.M. and Mao H.K. (1972b) Zoned olivine crystals in an Apollo 15 lunar rock. Carnegie Inst. Wash. Yr. Bk. 71, 470-472.
- Bell P.M. and Mao H.K. (1972b) Crystal-field studies of lunar samples. Carnegie Inst. Wash. Yr. Bk. 71, 480-489.
- Bell P.M. and Mao H.K. (1973a) An analytical study of iron in plagioclase from Apollo 16 soils 64501, 64502, 64802, rock 66095, and Apollo 15 rock 15475. Lunar Science IV, 57-59.
- Bell P.M. and Mao H.K. (1973b) An analytical study of iron in plagioclase from Apollo 16 soils 64501, 64502, and 64802; Apollo 16 rock 66095; and Apollo 15 rock 15475. Carnegie Ins. Wash. Yr. Bk. 72, 643-645.
- Bell P.M., Mao H.K., Roedder E., and Weiblen P.W. (1975) The problem of the origin of symplectites in olivine-bearing lunar rocks. Proc. Lunar Sci. Conf 6th, 231-248.
- Bence A.E. and Autier B. (1972) Secondary ion analysis of pyroxenes from two porphyritic lunar basalts. In The Apollo 15 Lunar Samples, 191-194.
- Bench A.E. and McGee J. (1976) Significance of the assemblage anorthite-aluminous enstatite-forsterite-aluminous spinel in the lunar highlands. Geol. Soc. Am. Abstracts with Programs 8, 772.
- Bence A.E. and Papike J.J. (1972) Pyroxenes as recorders of lunar basalt petrogenesis: chemical trends due to crystal-liquid interaction. Proc. Lunar Sci. Conf. 3rd, 431-469.
- Berking B., Jagodzinski H., and Schmid R. (1972) Crystallography of lunar feldspars and pyroxenes from 15076,55. In Apollo 15 Lunar Samples, 29-33.
- Bernatowicz T., Hohenberg C.M., Hudson B., Kennedy B.M., Morgan C.J., and Podosek F.A. (1977) Argon ages for Imbrium Consortium samples 14064 and 15405. Lunar Planet. Sci. VIII, 97-99.

- Bernatowicz T.J., Hohenberg C.M., Hudson B., Kennedy B.M., and Podosek F.A. (1978) Argon ages for lunar breccias 14064 and 15405. Proc. Lunar Planet. Sci. Conf. 9th, 905-919.
- Bernstein M.L. (1983) 15445 and 15455: Origin and preliminary age data. Lunar Planet. Sci. XIV, 33-34.
- Best J.B. and Minkin J.A. (1972) Apollo 15 glasses of impact origin. In The Apollo 15 Lunar Samples, 34-39.
- Bhandari N. (1977) Solar flare exposure ages of lunar rocks and boulders based on ^{26}Al . Proc. Lunar Sci. Conf. 8th, 3607- 3615.
- Bhandari N., Goswami J.N., and Lal D. (1972) Apollo 15 regolith: a predominantly accretion or mixing model? In The Apollo 15 Lunar Samples, 336-341.
- Bhandari N., Goswami J., and Lal D. (1973) Surface irradiation and evolution of the lunar regolith. Proc. Lunar Sci. Conf. 4th, 2275-2290.
- Bhattacharya S.K., Goswami J.N., Lal D., Patel P.P., and Rao M.N. (1975) Lunar regolith and gas-rich meteorites: Characterization based on particle tracks and grain-size distributions. Proc. Lunar Sci. Conf. 6th, 3509-3526.
- Bianco A.S. and Taylor L.A. (1977) Applications of dynamic crystallization studies: lunar olivine-normative basalts. Proc. Lunar Sci. Conf. 8th, 1593-1610.
- Bibring J.P., Burlingame A.L., Langevin Y., Maurette M., and Wszolek P.C. (1974) Simulation of lunar carbon chemistry: II. Lunar winds contribution. Proc. Lunar Sci. Conf. 5th, 1763- 1784.
- Bircke J.L., Fourcade S., and Allegre C.J. (1975) ^{87}Rb - ^{86}Sr age of rocks from the Apollo 15 landing site and significance of internal isochroms. Earth Planet. Sci. Lett. 26, 29-35.
- Blanchard D.P. and McKay G. (1980) Remnants from the ancient lunar crust II: Norite 15455. Lunar Planet. Sci. XI, 82-84.
- Blanford G.E., Fruland R.M., McKay D.S., and Morrison D.A. (1974) Lunar surface phenomena: Solar flare track gradients, micro-craters, and accretionary particles. Proc. Lunar Sci. Conf. 5th, 2501-2526.
- Blank H., Nobile R., Traxel K., and El Goresy A. (1982) Quantitative proton microprobe trace element analysis of coexisting opaque oxides in lunar rocks and their genetic implications. Lunar Planet. Sci. XIII, 49-50.

- Blank H., El Goresy A., Janicke J., Nobiling R., and Traxel K. (1983) Trace element zoning in coexisting chromite/ulvospinel in Apollo 12 samples -- analyzed by a proton beam micro-analyzer. Lunar Planet. Sci. XIV, 51-52.
- Bogard D.D. and Nyquist L.E. (1972) Noble gas studies on regolith materials from Apollo 14 and 15. Proc. Lunar Sci. Conf. 3rd, 1797-1819.
- Boyd F.R. (1972) Zoned pyroxenes in lunar rock 15555. Carnegie Inst. Wash. Yr. Bk. 71, 459-463.
- Brecher A. (1975) Textural remanence: a new model of lunar rock magnetism. Lunar Science VI, 83-85.
- Brecher A. (1976) Textural remanence: a new model of lunar rock magnetism. Earth Planet. Sci. Lett. 29, 131-145.
- Brett R. (1975) Thickness of some lunar mare basalt flows and ejecta blankets based on chemical kinetic data. Geochim. Cosmochim. Acta 39, 1135-1141.
- Brito U., Lalou C., Valladas G., Ceva T., and Visocekas R. (1973) Thermoluminescence of lunar fines (Apollo 12, 14 and 15) and lunar rock (Apollo 15). Proc. Lunar Sci. Conf. 4th, 2453- 2458.
- Brown G.E. and Wechsler B.A. (1973) Crystallography of pigeonites from basaltic interophyre 15597. Proc. Lunar Sci. Conf. 4th, 887-900.
- Brown G.M., Emeleus C.H., Holland J.G., Peckett A., and Phillips R. (1972a) Petrology, mineralogy, and classification of Apollo 15 mare basalts. In The Apollo 15 Lunar Samples, 40-44.
- Brown G.M., Emeleus C.H., Holland J.G., Peckett A., and Phillips R. (1972b) Mineral-chemical variations in Apollo 14 and Apollo 15 basalts and granitic fractions. Proc. Lunar Sci. Conf. 3rd, 141-157.
- Brownlee D.E., Horz F., Hartung J.B., and Gault D.E. (1972) Micrometeoroid craters smaller than 100 microns. In The Apollo 15 Lunar Samples, 407-411.
- Brownlee D.E., Horz F., Vedder J.F., Gault D.E., and Hartung J.B. (1973) Some physical parameters of micrometeoroids. Proc. Lunar Sci. Conf. 4th, 3197-3212.
- Brownlee D.E., Horz F., Hartung J.B. and Gault D.E. (1975) Density, chemistry, and size distribution of interplanetary dust. Proc. Lunar Sci. Conf. 6th, 3409-3416.
- Brunfelt A.O., Heier K.S., Nilssen B., Steinnes E., and Sundvoll B. (1972) Elemental composition of Apollo 15 samples. In The Apollo 15 Lunar Samples, 195-197.

- Brunfelt A.O., Heier K.S., Nilssen B., Sundvoll B., and Steinnes E. (1973a) Geochemistry of Apollo 15 and 16 materials. Proc. Lunar Sci. Conf. 4th, 1209-1218.
- Brunfelt A.O., Heier K.S., Nilssen B., Sundvoll B., and Steinnes E. (1973b) Geochemistry of Apollo 15 and 16 materials. Proc. Lunar Sci. Conf. 4th, 1209-1218.
- Bunch T.E., Quaide W., Prinz M., Keil K., and Dowty E. (1972) Lunar ultramafic glasses, chondrules and rocks. Nature Phys. Sci. 239, 57-59.
- Burns R.G. and Dyar M.D. (1984) Spectral chemistry of green glass-bearing 15426 regolith. Proc. Lunar Planet. Sci. Conf. 13, JGR 88 Supplement, B221-B228.
- Burns R.G. and Dyar M.D. (1983) Spectral chemistry of green glass-bearing 15426 regolith. Lunar Planet. Sci. XIV, 82-83.
- Burns R.G., Abu-Eid R.M., and Huggins F.E. (1972) Crystal field spectra of lunar pyroxenes. Proc. Lunar Sci. Conf. 3rd, 53-543.
- Burns R.G., Vaughan D.J., Abu-Eid R.M., Witner M., and Morawski A. (1973) Spectral evidence for Cr^3 , Ti^3 , and Fe^2 rather than Cr^2 and Fe^2 in lunar ferromagnesian silicates. Proc. Lunar Sci. Conf. 4th, 983-994.
- Butler J.C., King E.A., and Carman M.F. (1972) Size frequency distributions and petrographic observations of Apollo 15 samples. In The Apollo 15 Lunar Samples, 45-47.
- Butler P.B., Jr. (1978) Recognition of lunar glass droplets produced directly from endogenous liquids: the evidence from S-Zn coatings. Proc. Lunar Planet. Sci. Conf. 9th, 1459-1471.
- Butler P.B., Jr. and Meyer C., Jr. (1976) Sulfur prevails in coatings on glass droplets: Apollo 15 green and brown glasses and Apollo 17 orange and black (devitrified) glasses. Proc. Lunar Sci. Conf. 4th, 1561-1581.
- Cadenhead D.A. and Buergel W.G. (1973) Water vapor from a lunar breccia: implications for evolving planetary atmospheres. Science 180, 1166-1167.
- Cadenhead D.A. and Stetter J.R. (1974) The interaction of water vapor with a lunar soil, a compacted soil, and a cinder-like rock fragment. Proc. Lunar Sci. Conf. 5th, 2301-2316.
- Cadenhead D.A. and Stetter J.R. (1975) Specific gravities of lunar materials using helium pycnometry. Proc. Lunar Sci. Conf. 6th, 3199-3206.

- Cadenhead D.A., Jones B.R., Buergel W.G., and Stetter J.R. (1973) Solar wind and terrestrial atmosphere effects on lunar sample surface composition. Proc. Lunar Sci. Conf. 4th, 2391-2401.
- Cadenhead D.A., Stetter J.R., and Buergel W.G. (1974) Pore structure in lunar samples. J. Colloid Interface Sci. 47, 322-336.
- Cameron K.L. and Delano J.W. (1973) Petrology of Apollo 15 consortium breccia 15465. Proc. Lunar Sci. Conf. 4th, 461-466.
- Carlson R.W. and Lugmair G.W. (1979a) Sm-Nd constraints on early lunar differentiation and the evolution of KREEP. Earth Planet. Sci. Lett. 45, 123-132.
- Carlson R.W. and Lugmair G.W. (1979b) Sm-Nd study of pristine KREEP basalt 15386. Lunar Planet. Sci. X, 178-180.
- Carter J.L. (1972) Morphology and chemistry of glass surface of breccia 15015,36. In The Apollo 15 Lunar Samples, 51-53.
- Carter J.L. (1973) Morphology and chemistry of probably VLS (VaporLiquidSolid)-type of whisker structures and other features on the surface of breccia 15015,36. Proc. Lunar Sci. Conf. 4th, 413-421.
- Chappell B.W. and Green D.H. (1973) Chemical compositions and petrogenetic relationships in Apollo 15 mare basalts. Earth Planet. Sci. Lett. 18, 237-246.
- Chappell B.W., Compston W., Green D.H., and Ware N.G. (1972) Chemistry, geochronology, and petrogenesis of lunar sample 15555. Science 175, 415-416.
- Charette M.P. and Adams J.B. (1975) Mare basalts: characterization of compositional parameters by spectral reflectance. In Papers Presented to the Conference on Origins of Mare Basalts, LSI Contr. 234, 25-28. The Lunar Science Institute, Houston.
- Charette M.P. and Adams J.B. (1977) Spectral reflectance of lunar highland rocks. Lunar Science VIII, 172-174.
- Chou C.-L., Baedeker P.A., Bild R.W., and Wasson J.T. (1974) Volatile-element systematics and green glass in Apollo 15 lunar soils. Proc. Lunar Sci. Conf. 5th, 1645-1657.
- Christian R.P., Ansell C.S., Carron M.K., Cuttitta F., Dwornik E.J., Ligon D.T., Jr., and Rose H.J., Jr. (1972) Chemical composition of some Apollo 15 igneous rocks. In The Apollo 15 Lunar Samples, 206-209.

- Christian R.P., Berman S., Dwornik E.J., Rose H.J., and Schnepfe M. (1976) Composition of some Apollo 14, 15, and 16 breccias and two Apollo 15 fines. Lunar Science VII, 138-140.
- Christie J.M., Griggs D.T., Heuer A.H., Nord G.L., Jr., Radcliffe S.V., Lally J.S., and Fisher R.M. (1973) Electron petrography of Apollo 14 and 15 breccias and shock-produced analogs. Proc. Lunar Sci. Conf. 4th, 365-382.
- Chung D.H. (1973) Elastic wave velocities in anorthosite and anorthositic gabbros from Apollo 15 and 16 landing sites. Proc. Lunar Sci. Conf. 4th, 2591-2600.
- Chung D.H., and Westphal W.G. (1973) Dielectric spectra of Apollo 15 and 16 lunar solid samples. Proc. Lunar Sci. Conf. 4th, 3077-3091.
- Church S.E., Bansal B.M., and Wiesmann H. (1972) The distribution of K, Ti, Zr, U, and Hf in Apollo 14 and 15 materials. In The Apollo 15 Lunar Samples, 210-213.
- Chyi L.L. and Ehmann W.D. (1973) Zirconium and Hafnium abundances in some lunar materials and implications of their ratios. Proc. Lunar Sci. Conf. 4th, 1219-1226.
- Cirlin E.H. and Housley R.M. (1979) Scanning Auger microprobe and atomic absorption studies of lunar volcanic volatiles. Proc. Lunar Planet. Sci. Conf. 10th, 341-354.
- Cisowski S.M., Fuller M.D., We Y.M., Rose M.F., and Wasilewski P.J. (1975) Magnetic effects of shock and their implications for magnetism of lunar samples. Proc. Lunar Sci. Conf. 6th, 3123-3141.
- Cisowski S.M., and Fuller M. (1983) Lunar sample magnetic stratigraphy. Lunar Planet. Sci. XIV, 115-116.
- Clayton R.N. and Mayeda T.K. (1975) Genetic relations between the moon and meteorites. Proc. Lunar Sci. Conf. 6th, 1761-1769.
- Clayton R.N., Hurd J.M., and Mayeda T.K. (1972) Oxygen isotopic compositions and oxygen concentrations of Apollo 14 and Apollo 15 rocks and soils. Proc. Lunar Sci. Conf. 3rd, 1455-1463.
- Clayton R.N., Hurd J.M., and Mayeda T.K. (1973a) Oxygen isotopic compositions of Apollo 15, 16, and 17 samples, and their bearing on lunar origin and petrogenesis. Proc. Lunar Sci. Conf. 4th, 1535-1542.
- Clayton R.N., Mayeda T.K., and Hurd J.M. (1973b) Oxygen isotopic fractionation within ultrabasic clasts of lunar breccia 15445. J. Geol. **81**, 227-228.
- Cliff R.A., Lee-Hu C., and Wetherill G.W. (1972) K, Rb, and Sr measurements in Apollo 14 and 15 material. Lunar Science III, 146-147.

- Collinson D.W., Runcorn S.K., and Stephenson A. (1972) Magnetic properties of Apollo 15 rocks and fines. In The Apollo 15 Lunar Samples, 425-429.
- Collinson D.W., Stephenson A., and Runcorn S.K. (1973) Magnetic properties of Apollo 15 and 16 rocks. Proc. Lunar Sci. Conf. 4th, 2963-2976.
- Collinson D.W., Runcorn S.K., and Stephenson A. (1975) On changes in the ancient lunar magnetic field intensity. Lunar Science VI, 158-160.
- Compston W., de Laeter J.R., and Vernon M.J. (1972) Strontium isotope geology of Apollo 15 basalts. In The Apollo 15 Lunar Samples, 347-351.
- Compston W., Williams I.S., and Meyer C. (1984) Age and chemistry of zircon from late-stage lunar differentiates. Lunar Planet. Sci. XV, 182-183.
- Crawford M.L. (1973) Crystallization of plagioclase in mare basalts. Proc. Lunar Sci. Conf. 4th, 705-717.
- Crawford M.L. and Hollister L.S. (1977) Evolution of KREEP: Further petrologic evidence. Proc. Lunar Sci. Conf. 8th, 2403-2417.
- Cripe J.D. and Moore C.B. (1975) Total sulfur contents of Apollo 15, 16 and 17 samples. Lunar Science VI, 167-168.
- Crozaz G., Drozd R., Hohenberg C., Morgan C., Ralston C., Walker R., and Yuhas D. (1974) Lunar surface dynamics: Some general conclusions and new results from Apollo 16 and 17. Proc. Lunar Sci. Conf. 5th, 2475-2499.
- Cukierman M. and Uhlmann D.A. (1972) Viscous flow of lunar compositions. In The Apollo 15 Lunar Samples, 57-59.
- Cukierman M. and Uhlmann D.R. (1974) Effects of iron oxidation state on viscosity, lunar composition 15555. J. Geophys. Res. 79, 1594-1598.
- Cukierman M., Klein L., Scherer G., Hopper R.W., and Uhlmann D.R. (1973) Viscous flow and crystallization behaviour of selected lunar compositions. Proc. Lunar Sci. Conf. 4th, 2685-2696.
- Cuttitta F., Rose H.J., Jr., Ansell C.S., Carron M.K., Christian R.P., Ligon D.T., Jr., Dwornik E.J., Wright T.L., and Greenland L.P. (1973) Chemistry of twenty-one igneous rocks and soils returned by the Apollo 15 mission. Proc. Lunar Sci. Conf. 4th, 1081-1096.
- Czank M., Girgis K., Gubser R.A., Harnik A.B., Laves F., Schmit R., Schulz H., and Weber L. (1973) Temperature dependence of the diffuseness of c-reflections in Apollo 15 plagioclases. Lunar Science IV, 169-171.

- Dalton J. and Hollister L.S. (1974) Spinel-silicate co-crystallization relations in sample 15555. Proc. Lunar Sci. Conf. 5th, 421-429.
- Delano J.W. (1972) Petrologic examination of breccia 15465 and its implications as to the nature of the Appennine Front. In The Apollo 15 Lunar Samples, 60-61.
- Delano J.W. (1979) Apollo 15 green glass: Chemistry and possible origin. Proc. Lunar Planet. Sci. Conf. 10th, 275-300.
- Delano J.W. (1980a) Apollo 15 yellow glasses: Chemistry and possible origins. Lunar Planet. Sci. XI, 213-215.
- Delano J.W. (1980b) Chemistry and liquidus phase relations of Apollo 15 red glass: implications for the deep lunar interior. Proc. Lunar Planet. Sci. Conf. 11th, 251-288.
- Delano J.W. (1984) Vesicles in four varieties of Apollo 15 volcanic glass. Lunar Planet. Sci. XV, 218-219.
- Delano J.W. and Lindsley D.H. (1982) New data on the fractionation trend in the Apollo 15 volcanic green glasses: Groups B, C. Lunar Planet. Sci. XIII, 162-163.
- Delano J.W. and Livi K. (1981) Lunar volcanic glasses and their constraint on mare petrogenesis. Geochim. Cosmochim. Acta 45, 2137-2149.
- Delano J.W., Lindsley D.H., and Rudowski R. (1981) Glasses of impact origin from Apollo 11, 12, 15, and 16: evidence for fractional vaporization and mare/highland mixing. Proc. Lunar Planet. Sci. Conf. 12th, 339-370.
- Delano J.W., Lindsley D.H., Ma M.-S., and Schmitt R.A. (1982a) Petrology and trace element chemistry of the Apollo 15 yellow impact glasses. Lunar Planet. Sci. XIII, 166-167.
- Delano J.W., Lindsley D.H., Ma M.-S., and Schmitt R.A. (1982b) The Apollo 15 yellow impact glasses: Chemistry, petrology, and exotic origin. Proc. Lunar Planet. Sci. Conf. 13th, A159-A170.
- DesMarais D.J. (1978) Carbon, nitrogen, and sulfur in Apollo 15, 16 and 17 rocks. Proc. Lunar Planet. Sci. Conf. 9th, 2451- 2467.
- DesMarais D.J., Hayes J.M., and Meinschein W.G. (1972) Pyrolysis study of carbon in lunar fines and rocks. In The Apollo 15 Lunar Samples, 294-298.
- DesMarais D.J., Hayes J.M., and Meinschein W.G. (1973) The distribution in lunar soil of carbon released by pyrolysis. Proc. Lunar Sci. Conf. 4th, 1543-1558.

- DesMarais D.J., Hayes J.M., and Meinschein W.G. (1974) The distribution in lunar soil of hydrogen released by pyrolysis. Proc. Lunar Sci. Conf. 5th, 1811-1822.
- Dickinson J.E. and Hess P.C. (1982) Whitlockite saturation in lunar basalts. Lunar Planet. Sci. XIII, 172-173.
- Dixon J.R. and Papike J.J. (1975) Petrology of anorthosites from the Descartes region of the Moon: Apollo 16. Proc. Lunar Sci. Conf. 6th, 263-291.
- Dollfus A. and Geake J.E. (1975) Polarimetric properties of the lunar surface and its interpretation: Part 7--other solar system objects. Proc. Lunar Sci. Conf. 6th, 2749-2768.
- Donaldson C.H., Drever H.I., and Johnston R. (1977) Supercooling on the lunar surface: a review of analogue information. Phil. Trans. R. Soc. Lond. A 285, 207-217.
- Dowty E., Keil K., and Prinz M. (1972) Anorthosite in the Apollo 15 rake sample from Spur Crater. In The Apollo 15 Lunar Samples, 62-66.
- Dowty E., Prinz M., and Keil K. (1973a) Composition, mineralogy, and petrology of 28 mare basalts from Apollo 15 rake samples. Proc. Lunar Sci. Conf. 4th, 423-444.
- Dowty E., Conrad G.H., Green J.A., Hlava P.F., Keil K., Moore R.G., Nehru C.E., and Prinz M. (1973b) Catalogue of Apollo 15 rake samples from stations 2 (St. George), 7 (Spur Crater), and 9a (Hadley Rille). Univ. New Mexico Inst. of Meteoritics, Sp. Pub #8, 75 pp.
- Dowty E., Prinz M., Nehru C.E., Moreland G., Moore R.B., Keil K., Hlava P.F., and Green J.A. (1973c) Electron microprobe analyses of minerals from Apollo 15 mare basalt rake samples. Univ. New Mexico Inst. of Meteoritics, Sp. Pub. #9, 113 pp.
- Dowty E., Keil K., and Martin P. (1974) Lunar pyroxene-phyric basalts: crystallization under super-cooled conditions. J. Petrol. 15, 419-453.
- Dowty E., Keil K., Prinz M., Gros J., and Takahashi H. (1976) Meteorite-free Apollo 15 crystalline KREEP. Proc. Lunar Sci. Conf. 7th, 1833-1844.
- Drake J.C. and Klein C., Jr. (1972) Mineralogical and chemical studies of breccia 15086. In The Apollo 15 Lunar Samples, 67-69.
- Drake J.C. and Klein C., Jr. (1973) Lithic fragments and glasses in microbreccia 15086: Their chemistry and occurrence. Proc. Lunar Sci. Conf. 4th, 467-479.

- Dran J.C., Duraud J.P., Maurette M., Durrieu L., Jouret C., and Legressns C. (1972) Track metamorphism in extraterrestrial breccias. Proc. Lunar Sci. Conf. 3rd, 2883-2903.
- Drever H.I., Johnston R., and Brebner G. (1973) Radiate texture in lunar igneous rocks and terrestrial analogs. Lunar Science IV, 187-189.
- Drozd R.J., Hohenberg C.M., Morgan C.J., and Ralston C.E. (1974) Cosmic ray exposure history of the Apollo 16 and other lunar sites: lunar surface dynamics. Geochim. Cosmochim. Acta 38, 1625-1642.
- Drozd R.J., Kennedy B.M., Morgan C.J., Podosek F.A. and Taylor G.J. (1976) The excess fission xenon problem in lunar samples. Proc. Lunar Sci. Conf. 7th, 599-623.
- Duncan A.R., Erlank A.J., Sher M.K., Abraham Y.C., Willis J.P., and Ahrens L.H. (1976) Some trace element constraints on lunar basalt genesis. Proc. Lunar Sci. Conf. 7th, 1659-1671.
- Duncan A.R., Sher M.K., Abraham Y.C., Erlank A.J., Willis J.P., and Ahrens L.H. (1975) Interpretation of the compositional variability of Apollo 15 soils. Proc. Lunar Sci. Conf. 6th, 2309-2320.
- Dunn J.R. and Fuller M. (1972) On the remanent magnetism of lunar samples with special reference to 10048,55 and 14053,48. Proc. Lunar Sci. Conf. 3rd, 2363-2386.
- Dymek R.F., Albee A.L., and Chodos A.A. (1974) Glass-coated soil breccia 15205: Selenologic history and petrologic constraints on the nature of its source region. Proc. Lunar Sci. Conf. 5th, 235-260.
- Ehmann W.D. and Chyi L.L. (1974) Abundances of the group IVB elements Ti, Zr, and Hf and implications of their ratios in lunar materials. Proc. Lunar Sci. Conf. 5th, 1015-1024.
- Ehmann W.D., Janghorbani M., and Gillum D.E. (1972) Elemental abundance studies of Apollo 15 and some Fra Mauro formation lunar samples. In The Apollo 15 Lunar Samples, 214-216.
- Ehmann W.D., Chyi L.L., Garg A.N., Hawke B.R., Ma M.-S., Miller M.D., James W.D., Jr., and Pacer R.A. (1975) Chemical studies of the lunar regolith with emphasis on zirconium and hafnium. Proc. Lunar Sci. Conf. 6th, 1351-1361.
- Eisentraut K.J., Black M.S., Hileman F.D., Sievers R.E., and Ross W.D. (1972) Beryllium and chromium abundances in Fra Mauro and Hadley-Apennine lunar samples. Proc. Lunar Sci. Conf. 3rd, 1327-1333.

- Eldridge J.S., O'Kelley G.D., and Northcutt K.J. (1972) Concentrations of cosmogenic radionuclides in Apollo 15 rocks and soil. In The Apollo 15 Lunar Samples, 357-359.
- El Goresy A., Prinz M., and Ramdohr P. (1976) Zoning in spinels as an indicator of the crystallization histories of mare basalts. Proc. Lunar Sci. Conf. 7th, 1261-1279.
- Engelhardt W. von (1979) Ilmenite in the crystallization sequence of lunar rocks. Proc. Lunar Planet. Sci. Conf. 10th, 677-694.
- Engelhardt W. von, Arndt O., and Schneider H. (1972) Apollo 15 Regolith and breccias. In The Apollo 15 Lunar Samples, 174-178.
- Engelhardt W. von, Arndt J., and Schneider H. (1973) Apollo 15: Evolution of the regolith and origin of glasses. Proc. Lunar Sci. Conf. 4th, 239-249.
- Epstein S. and Taylor H.P., Jr. (1972) O^{18}/O^{16} , Si^{30}/Si^{28} , C^{13}/C^{12} , and D/H studies of Apollo 14 and 15 studies of Apollo 14 and 15 samples. Proc. Lunar Sci. Conf. 3rd, 1429-1454.
- Eugster O., Eberhardt P., Geiss J., Grogler N., Jungck M., Meier F., Morgeli M., and Niederes F. (1984) Cosmic ray exposure histories of Apollo 14, Apollo 15, and Apollo 16 rocks. Proc. Lunar Planet. Sci. Conf. 14, JGR 89 Supplement, B498-B512.
- European Consortium (Eglinton and others) (1974) The history of lunar breccia 15015. Lunar science V, 217-219.
- European Consortium (1977) The history of lunar breccia 15015 in Lunar Sample Studies, NASA SP-418, 1-33.
- Evans H.T., Jr., Huebner J.S., and Konnest J.A. (1978) The crystal structure and thermal history of orthopyroxene from lunar anorthosite 15415. Earth Planet. Sci. Lett. 37, 476-484.
- Evensen N.M., Murthy V.R., and Coscio M.R., Jr. (1973) Rb-Sr ages of some mare basalts and the isotopic and trace element systematics in lunar fines. Proc. Lunar Sci. Conf. 4th, 1707-1724.
- Fabel G.W., White W.B., White E.W., and Roy R. (1972) Structure of lunar glasses by Raman and soft x-ray spectroscopy. Proc. Lunar Sci. Conf. 3rd, 939-951.
- Fang C.Y., Yinnon H., and Uhlmann D.R. (1983) Cooling rates for glass containing lunar compositions. Proc. Lunar Planet. Sci. Conf. 13, JGR 88 Supplement, A907-A911.

- Fechtig H., Hartung J.B., Nagel K., Neukum G., and Storzer D. (1974) Lunar microcrater studies, derived meteoroid fluxes, and comparison with satellite-born experiments. Proc. Lunar Sci. Conf 5th, 2463--2474.
- Fernandez-Moran H., Virgo D., and Ohtsuki M. (1973) High resolution electron microscopy and electron diffraction of Apollo 15 lunar pyroxenes. Lunar science IV, 236-238.
- Filleux C., Spear R.H., Tombrello T.A., and Burnett D.S. (1978) Direct measurement of surface carbon concentrations for lunar soil breccias. Proc. Lunar Planet. Sci. Conf. 9th, 1599-1617.
- Fireman E.L. (1972) Depth variation of Ar³⁷ and Ar³⁹ in lunar material. In The Apollo 15 Lunar Samples, 364-367.
- Fireman E.L., D'Amico dr., DeFelice J., and Spannagel G. (1972) Radioactivities in returned lunar materials. Proc. Lunar Sci. Conf. 3rd, 1747-1762.
- Fleischer R.L. and Hart H.R., Jr. (1972) Particle track record of Apollo 15 green soil and rock. In The Apollo 15 Lunar Samples, 368-370.
- Fleischer R.L. and Hart H.R., Jr. (1973) Particle track record of Apollo 15 green soil and rock. Earth Planet. Sci. Lett. 18, 357-364.
- Fleischer R.L. and Hart H.R., Jr. (1974) Uniformity of the uranium content of lunar green and orange glasses. Proc. Lunar Sci. Conf. 5th, 2251-2255.
- Fleischer R.L., Hart H.R., Jr., and Giard W.R. (1973) Particle track record of Apollo 15 shocked crystalline rocks. Proc. Lunar Sci. Conf. 4th, 2307-2317.
- Flory D.A., Oro J., Wikstrom S., Beaman D., and Nooner D. (1972) Analysis of organogenic compounds in Apollo 15 samples. In The Apollo 15 Lunar Samples, 275-279.
- Friebele E.J., Griscom D.L., Marquardt C.L., Weeks R.A., and Prestel D. (1974) Temperature dependence of the ferromagnetic resonance linewidth of lunar soils, iron and magnetite precipitates in simulated lunar glasses, and nonspherical metallic iron particles. Proc. Lunar Sci. Conf. 5th, 2729-2736.
- Friedman I., Hardcastle K.G., and Gleason J.D. (1972) Isotopic composition of carbon and hydrogen in some Apollo 14 and 15 samples. In The Apollo 15 Lunar Samples, 302-306.
- Fruchter J.S., Stoesser J.W., Lindstrom M.M., and Goles G.G. (1973) Apollo 15 clastic materials and their relationship to geological features. Proc. Lunar Sci. Conf. 4th, 1227-1237.

- Fruchter J.S., Rancitelli L.A., Evans J.C., and Perkins R.W. (1978) Lunar surface processes and cosmic ray histories over the past several million years. Proc. Lunar Planet. Sci. Conf. 9th, 2019-2032.
- Fuller M., Meshkov E., Cisowski S.M., and Hale C.J. (1979) On the natural remanent magnetism of certain mare basalts. Proc. Lunar Planet. Sci. Conf. 10th, 2211-2233.
- Ganapathy R., Morgan J.W., Krahenbuhl U., and Anders E. (1973) Ancient meteoritic components in lunar highland rocks: Clues from trace elements in Apollo 15 and 16 samples. Proc. Lunar Sci. Conf. 4th, 1239-1261.
- Garg A.N. and Ehmann W.N. (1976) Zr-Hf fractionation in chemically defined lunar rock groups. Proc. Lunar Sci. Conf. 7th, 3397-3410.
- Garner E.L., Machlan L.A., and Barnes I.L. (1975a) The isotopic composition of Li, K and Rb in some Apollo 11, 12, 15 and 16 samples. Lunar science VI, 279-281.
- Garner E.L., Machlan L.A., and Barnes I.L. (1975b) The isotopic composition of lithium, potassium, and rubidium in some Apollo 11, 12, 14, 15, and 16 samples. Proc. Lunar Sci. Conf. 6th, 1845-1855.
- Garvin J.B., Head J.W., III, and Wilson L. (1982) Magma vesiculation in Apollo 15 mare basalts: observations and theory. Lunar Planet. Sci. XIII, 255-256.
- Gay P., Muir I.D., and Price G.G. (1972) Mineralogy and petrology of two Apollo 15 mare basalts. In The Apollo 15 Lunar Samples, 70-72.
- Geake J.E., Walker G., Talfer D.J., Mills A.A., and Garlick G.F.J. (1973) Luminescence of lunar, terrestrial and synthesized plagioclase, caused by Mn^{2+} and Fe^{3+} . Proc. Lunar Sci. Conf. 4th, 3181-3189.
- Gibson E.K., Jr., and Andrawes F.F. (1978) Nature of the gases released from lunar rocks and soils upon crushing. Proc. Lunar Planet. Sci. Conf. 9th, 2433-2450.
- Gibson E.K. and Moore G.W. (1972) Thermal analysis-inorganic gas release studies on Apollo 14, 15, and 16 lunar samples. In The Apollo 15 Lunar Samples, 307-310.
- Gibson E.K., Jr., Chang S., Lennon K., Moore G.W., and Pearce G.W. (1975) Sulfur abundances and distributions in mare basalts and their source magmas. Proc. Lunar Sci. Conf. 6th, 1287-1301.
- Gleadow A.J.W., LeMaitre R.W., Sewell D.K.B., and Lovering J.F. (1974) Chemical discrimination of petrographically defined clast groups in Apollo 14 and 15 lunar breccias. Chem. Geol. L4, 39-61.

- Gold T., Bilson E., and Baron R.L. (1974) Observation of iron-rich coating on lunar grains and a relation to low albedo. Proc. Lunar Sci. Conf. 5th, 2413-2422.
- Gold T., Bilson E., and Baron R.L. (1975) A uger analysis of the lunar soil: Study of processes which change the surface chemistry and albedo. Proc. Lunar Sci. Conf. 6th, 3285-3303.
- Gold T., Bilson E., and Baron R.L. (1976) The surface chemical composition of lunar samples and its significance for optical properties. Proc. Lunar Sci. Conf. 7th, 901-911.
- Goldberg R.H., Burnett D.S., and Tombrello T.A. (1975) Fluorine surface films on lunar samples: Evidence for both lunar and terrestrial origins. Proc. Lunar Sci. Conf. 6th, 2189-2200.
- Goldberg R.H., Tombrello T.A., and Burnett D.S. (1976) Fluorine as a constituent in lunar magmatic gases. Proc. Lunar Sci. Conf. 7th, 1597-1613.
- Gose W.A., Pearce G.W., Strangway D.W., and Carnes J. (1972) Magnetism of Apollo 15 samples. In The Apollo 15 Lunar Samples, 430-434.
- Gose W.A., Strangway D.W., and Pearce G.W. (1973a) A determination of the intensity of the ancient lunar magnetic field. The Moon, 7, 198-201.
- Gose W.A., Strangway D.W., Pearce G.W., and Carnes J.G. (1973b) The time dependent magnetization of lunar breccias of low metamorphic grade. Lunar Science IV, 309-311.
- Goswami J.N., Hutcheon I.D., and MacDougall J.D. (1976) Microcraters and solar flare tracks in crystals from carbonaceous chondrites and lunar breccias. Proc. Lunar Sci. Conf. 7th, 543-562.
- Graf H., Shirck J., Sun S., and Walker R. (1973) Fission track astrology of three Apollo 14 gas-rich breccias. Proc. Lunar Sci. Conf. 4th, 2145-2155.
- Gregor R.B. and Lytle F.W. (1983) Preliminary investigation of Ti-site grometry in lunar volcanic and impact glasses by x-ray absorption spectroscopy. Lunar Planet. Sci. XIV, 257-258.
- Greenman N.H. and Gross H.G. (1972) Luminescence of Apollo 14 and Apollo 15 lunar samples. Proc. Lunar Sci. Conf. 3rd, 2981- 2995.
- Griscom D.L. and Marquardt C.L. (1972) Evidence of lunar surface oxidation processes: Electron spin resonance spectra of lunar materials and simulated lunar materials. Proc. Lunar Sci. Conf. 3rd, 2397-2415.

- Griscom D.L., Friebele E.J., and Marquardt C.L. (1973) Evidence for a ubiquitous, sub-microscopic "magnetite-like" constituent in lunar soils. Proc. Lunar Sci. Conf. 4th, 2709-2727.
- Griscom D.L., Marquardt C.L., and Friebele E.J. (1975) Magnetic phases in lunar green and orange glass droplets: possible relics of mare volcanism. Lunar Science VI, 315-317.
- Gros J., Takahashi H., Hertogen J., Morgan J.W., and Anders E. (1976) Composition of the projectiles that bombarded the lunar highlands. Proc. Lunar Sci. Conf. 7th, 2403-2425.
- Grove T.L. (1981) Compositional variations among Apollo 15 green glass spheres. Proc. Lunar Planet. Sci. Conf. 12B, 935-948.
- Grove T.L. (1982) Use of exsolution lamellae in lunar clinopyroxenes as cooling rate speedometers: an experimental calibration. Am. Min. 67, 251-268.
- Grove T.L. and Bence A.E. (1977) Experimental study of pyroxene-liquid interaction in quartz-normative basalt 15597. Proc. Lunar Sci. Conf. 8th, 1549-1579.
- Grove T.L. and Lindsley D.H. (1979a) An experimental study on the crystallization of pyroxferroite. Lunar Planet. Sci. X, 470-472.
- Grove T.L. and Lindsley D.H. (1979b) The partitioning of Fe, Mg, and Ca between pigeonite and liquid in lunar basalts. Lunar Planet. Sci. X, 473-475.
- Grove T.L. and Randsepp M. (1978) Effects of kinetics on the crystallization of quartz-normative basalt 15597: An experimental study. Proc. Lunar Planet. Sci. Conf. 9th, 585-599.
- Grove T.L. and Walker D. (1977) Cooling histories of Apollo 15 quartz-normative basalts. Proc. Lunar Sci. Conf. 8th, 1501- 1520.
- Haggerty S.E. (1971) Subsolidus reduction of lunar spinels. Nature Phys. Sci. 234, 113-117.
- Haggerty S.E. (1972a) Chemical characteristics of spinels in some Apollo 15 basalts. In The Apollo 15 Lunar Samples, 92-97.
- Haggerty S.E. (1972b) Apollo 14: subsolidus reduction and compositional variations of spinels. Proc. Lunar Sci. Conf. 3rd, 305-332.
- Haggerty S.E. (1972c) Solid solution characteristics of lunar spinels. Carnegie Inst. Wash. Yr. Bk. 71, 474-480.

- Haggerty S.E. (1972d) Solid solution, subsolidus reduction, and compositional characteristics of spinels in some Apollo 15 basalts. Meteoritics 7, 353-370.
- Haines E.L. and Weiss J.R. (1978) KREEP fission track ages from Hadley Delta. Lunar and Planet. Sci. IX, 448-450.
- Hale C.J., Fuller M., and Bailey R.C. (1978) On the application of microwave heating to lunar paleointensity determination. Proc. Lunar Planet. Sci. Conf. 9th, 3165-3179.
- Handwerker C.A., Klein L.C., Onorato P.I.K., and Uhlmann D.R. (1977) Matrix glass v. intruded glass in lunar breccia 15286. Proc. Lunar Sci. Conf. 8th, 2581-2592.
- Hansen E.C., Steele I.M., and Smith J.V. (1979) Lunar highland rocks: Element partitioning among minerals 1: Electron microprobe analyses of Na, Mg, K and Fe in plagioclase; Mg partitioning with orthopyroxene. Proc. Lunar Planet. Sci. Conf. 10th, 627-638.
- Hargraves R.B. and Dorety N. (1972) Remanent magnetism in four Apollo 15 igneous rock fragments. In The Apollo 15 Lunar Samples, 438-439.
- Hargraves R.B. and Hollister L.S. (1972) Mineralogic and petrologic study of lunar anorthosite slide 15415,18. Science 175, 430-432.
- Hartung J.B. and Storzer D. (1974) Lunar microcraters and their solar flare track record. Proc. Lunar Sci. Conf. 5th, 2527-2541.
- Haskin L.A., Helmke P.A., Paster T.P., and Allen R.O. (1971) Rare earths in meteoritic, terrestrial, and lunar matter. In Activation Analysis in Geochemistry and Cosmochemistry (A.O. Brunfelt and E. Steinnnes, eds.), Universitets forlaget, Oslo, 201-218.
- Haskin L.A., Lindstrom M.M., Salpas P.A., and Lindstrom D.J. (1981) On compositional variations among lunar anorthosites. Proc. Lunar Planet. Sci. Conf. 12th, 41-66.
- Helmke P.A. and Haskin L.A. (1972) Rare earths and other trace elements in Apollo 15 samples. In The Apollo 15 Lunar Samples, 217-220.
- Helmke P.A., Blanchard D.P., Haskin L.A., Telander K., Weiss C., and Jacobs J.W. (1973) Major and trace elements in igneous rocks from Apollo 15. The Moon 8, 129-148.
- Hemingway B.S., Robie R.A., and Wilson W.H. (1973) Specific heats of lunar soils, basalt, and breccias from the Apollo 14, 15, and 16 landing sites, between 90° and 350° K. Proc. Lunar Sci. Conf. 4th, 2481-2487.

- Hertogen J., Janssens M., Takahashi H., Palme H., and Anders E. (1977) Lunar basins and craters: evidence for systematic compositional changes of bombarding population. Proc. Lunar Sci. Conf. 8th, 17-45.
- Herzberg C.T. (1978) The bearing of spinel cataclasites on the crust-mantle structure of the Moon. Proc. Lunar Planet. Sci. Conf. 9th, 319-336.
- Hess P.C., Rutherford M.J., and Campbell H.W. (1978) Ilmenite crystallization in nonmare basalt: genesis of KREEP and high-Ti mare basalt. Proc. Lunar Planet. Sci. Conf. 9th, 705-724.
- Heuer A.H., Lally J.S., Christie J.M., and Radcliffe S.V. (1972a) Phase transformations and exsolution in lunar and terrestrial calcic plagioclases. Phil. Mag. 26, 465-482.
- Heuer A.H., Nord G.L., Jr., Radcliffe S.V., Fisher R.M., Lally J.S., Christie J.M., and Griggs D.T. (1972b) High voltage (HVEM) electron petrographic study of Apollo 15 rocks. In Apollo 15 Lunar Samples, 98-102.
- Hewins R.H. and Goldstein J.I. (1975) The provenance of metal in anorthositic rocks. Proc. Lunar Sci. Conf. 6th, 343-362.
- Heymann D. (1975) Argon-Lead isotopic correlation in samples from lunar maria: records from the ancient lunar regolith. Earth Planet. Sci. Lett. 27, 445-448.
- Higuchi H., Gros J., and Morgan J.W. (1975) Cesium content of lunar samples (10 papers). Proc. Lunar Sci. Conf. 6th, Errata xii-xv.
- Hinterberger H., Schultz L., and Weber H.W. (1975) Differences of the rare gas abundance pattern between lunar soils and breccias. Lunar Science VI, 367-369.
- Hlava P.F., Green J.A., Prinz M., Nehru C.E., Keil K., Dowty E., and Bunch T.E. (1973) Apollo 15 rake sample microbreccias and non-mare rocks: bulk rock, mineral and glass electron microprobe analyses. Univ. New Mexico, Sp. Pub. #11, 78 pp.
- Hodges F.N. and Kushiro I. (1973) Liquidus phase relations of Apollo 15 mare basalt 15016. Carnegie Inst. Wash. Yr. Bk. 72, 646-647.
- Hoffman K.A. and Banerjee S.K. (1975) Magnetic "zig-zag" behaviour in lunar rocks. Earth Planet. Sci. Lett. 25, 331-337.
- Hollister L.S. and Crawford M.L. (1977a) Evidence for a direct genetic connection between Apollo 15 KREEP and Apollo 12 and 15 basalts. Lunar science VIII, 452-454.
- Hollister L.S. and Crawford M.L. (1977b) Melt immiscibility in Apollo 15 KREEP: Origin of Fe-rich mare basalts. Proc. Lunar Sci. Conf. 8th, 2419-2432.

- Horz F., Brownlee D.E., Fechtig H., Hartung J.B., Morrison D.A., Neukum G., Schneider E., Vedder J.F., and Gault D.E. (1975) Lunar microcraters = implications for the micrometeoroid complex. Planet. Space Sci. 23, 151-172.
- Horz F., Morrison D.A., Gault D.E., Oberbeck V.R., Quaide W.L., Vedder J.F., Brownlee D.E., and Hartung J.B. (1977) The Soviet-American Conference on Cosmochemistry of the Moon and Planets, NASA SP-370, 605-635.
- Housley R.M., Cirlin E.H., Goldberg I.B., and Crowe H. (1976) Ferromagnetic resonance studies of lunar core stratigraphy. Proc. Lunar Sci. Conf. 7th, 13-26.
- Hoyt H.P., Jr., Walker R.M., Zimmerman D.W., and Zimmerman J. (1972) Thermoluminescence of individual grains and bulk samples of lunar fines. Proc. Lunar Sci. Conf. 3rd, 2997-3007.
- Hubbard N.J., Gast P.W., Rhodes J.M., Bansal B.M., Wiesmann H., and Church S.E. (1972) Nonmare basalts: Part II. Proc. Lunar Sci. Conf. 3rd, 1161-1179.
- Hubbard N.J., Rhodes J.M., Gast P.W., Bansal B.M., Shih C.-Y., Weismann H., and Nyquist L.E. (1973) Lunar rock types: The role of plagioclase in non-mare and highland rock types. Proc. Lunar Sci. Conf. 4th, 1297-1312.
- Hubbard N.J., Rhodes J.M., Wiesmann H., Shih C.-Y. and Bansal B.M. (1974) The chemical definition and interpretation of rock types returned from the non-mare regions of the Moon. Proc. Lunar Sci. Conf. 5th, 1227-1246.
- Huffman G.P. and Dunmyre G.R. (1975) Superparamagnetic clusters of Fe² spins in lunar olivine: Dissolution by high-temperature annealing. Proc. Lunar Sci. Conf. 6th, 757-772.
- Huffman G.P., Schwerer F.C., and Fisher R.M. (1972) Mossbauer analyses of Apollo 15 samples. In The Apollo 15 Lunar Samples, 440-441.
- Huffman G.P., Schwerer F.C., Fisher R.M., and Nagata T. (1974) Iron distributions and metallic-ferrous ratios for Apollo lunar samples: Mossbauer and magnetic analyses. Proc. Lunar Sci. Conf. 5th, 2779-2794.
- Huffman G.P., Dunmyre G.R., and Fisher R.H. (1975) Superparamagnetic clusters of Fe² spins in lunar olivines. Lunar Science VI, 414-416.
- Hughes T.C., Keays R.R. and Lovering J.F. (1973) Siderophile and volatile trace elements in Apollo 14, 15, and 16 rocks and fines: evidence for extralunar component and Tl- Au-, and Ag-enriched rocks in the ancient lunar crust. Lunar Science IV, 400-402.

- Humphries D.J., Biggar G.M., and O'Hara M.J. (1972) Phase equilibria and origin of Apollo 15 basalts etc. In The Apollo 15 Lunar Samples, 103-107.
- Huneke J.C., Podosek F.A., and Wasserburg G.J. (1973) An argon bouillabaise including ages from the Luna 20 site. Lunar Science IV, 403-405.
- Huneke J.C., Jessberger E.K., and Wasserburg G.J. (1974) The age of metamorphism of a highland breccia (65015) and a glimpse at the age of its protolith. Lunar Science V, 375-377.
- Husain L. (1972) The ^{40}Ar - ^{39}Ar and cosmic ray exposure ages of Apollo 15 crystalline rocks, breccias, and glasses. In The Apollo 15 Lunar Samples, 374-377.
- Husain L. (1974) ^{40}Ar - ^{39}Ar chronology and cosmic ray exposure ages of the Apollo 15 samples. J. Geophys. Res. 79, 2588-2606.
- Husain L., Schaeffer O.A., and Sutter J.F. (1972a) Age of a lunar anorthosite. Science 175, 428-430.
- Husain L., Schaeffer O.A., Funkhouser J., and Sutter J. (1972b) The ages of lunar material from Fra Mauro, Hadley Rille, and Spur Crater. Proc. Lunar Sci. Conf. 3rd, 1557-1567.
- Hutcheon I.D., Braddy D., Phakey P.P., and Price P.B. (1972a) Study of solar flares, cosmic dust and lunar erosion with vesicular basalts. In The Apollo 15 Lunar Samples, 412-414.
- Hutcheon I.D., Phakey P.P., and Price P.B. (1972b) Studies bearing on the history of lunar breccias. Proc. Lunar Sci. Conf. 3rd, 2845-2865.
- Interdisciplinary Studies by the Imbrium Consortium Vol. 1 (Ed. J.A. Wood) LSI Contrib. 267D. Center for Astrophysics, Cambridge.
- Interdisciplinary Studies by the Imbrium Consortium Vol. 2 (Eds. K. Motylewski and J.A. Wood) LSI Contrib. 268D. Center for Astrophysics, Cambridge.
- Irving A.J. (1977a) Chemical and experimental constraints on the genesis of Apollo 15 and Apollo 17 KREEP basalts. Lunar Science VIII, 493-495.
- Irving A.J. (1977b) Chemical variation and fractionation of KREEP basalt magmas. Proc. Lunar Sci. Conf. 8th, 2433-2448.
- Jagodzinski H. and Korekawa M. (1973) Diffuse x-ray scattering by lunar minerals. Proc. Lunar Sci. Conf. 4th, 933-951.

- James O.B. (1972) Lunar anorthosite 15415: texture, mineralogy, and metamorphic history. Science 175, 432-435.
- James O.B. (1977) Lunar highlands breccias generated by major impacts. In The Soviet-American Conference on Cosmochemistry of the Moon and Planets. NASA SP-370, 637-658.
- James O.B. and Flohr M.K. (1983) Subdivision of the Mg-suite noritic rocks into Mg-gabbronorites and Mg-norites. Proc. Lunar Planet. Sci. Conf. 13, JGR 88 Supplement, A603-A614.
- Janghorbani M., Miller M.D., Ma M.-S., Chyi L.L., and Ehmann W.D. (1973) Oxygen and other elemental abundance data for Apollo 14, 15, 16, and 17 samples. Proc. Lunar Sci. Conf. 4th, 1115-1126.
- Jedwab J. (1972) Mineralogical notes on Apollo 15 samples. In The Apollo 15 Lunar Samples, 108-109.
- Jovanovic S. and Reed G.W., Jr. (1975) Soil breccia relationships and vapor deposits on the Moon. Proc. Lunar Sci. Conf. 6th, 1753-1759.
- Jovanovic S. and Reed G.W., Jr. (1976a) Chemical fractionation of Ru and Os in the Moon. Proc. Lunar Sci. Conf. 7th, 3437-3446.
- Jovanovic S. and Reed G.W., Jr. (1976b) Convection cells in the early lunar magma ocean: trace element evidence. Proc. Lunar Sci. Conf. 7th, 3447-3459.
- Jovanovic S. and Reed G.W., Jr. (1977) Trace element geochemistry and the early lunar differentiation. Proc. Lunar Sci. Conf. 8th, 623-632.
- Jovanovic S. and Reed G.W., Jr. (1978) Trace element evidence for a laterally inhomogeneous Moon. Proc. Lunar Planet. Sci. Conf. 9th, 59-80.
- Juan V.C., Chen J.C., Huang C.K., Chen P.Y., and Wang Lee C.M. (1972a) Petrology and chemistry of some Apollo 15 crystalline rocks. In The Apollo 15 Lunar Samples, 110-115.
- Juan V.C., Chen J.C., Huang C.K., Chen P.Y., and Wang Lee C.M. (1972b) Petrology and chemistry of some Apollo 15 regoliths. In The Apollo 15 Lunar Samples, 116-122.
- Kaplan I.R., Kerridge J.F., and Petrowski C. (1976) Light element geochemistry of the Apollo 15 site. Proc. Lunar Sci. Conf. 7th, 4 81-492.

- Keith J.E. and Clark R.S. (1974) The saturated activity of B₂B₆Al in lunar samples as a function of chemical composition and the exposure ages of some lunar samples. Proc. Lunar Sci. Conf. 5th, 2105-2119.
- Keith J.E., Clark R.S., and Richardson K.A. (1972) Gamma-ray measurements of Apollo 12, 14, and 15 lunar samples. Proc. Lunar Sci. Conf. 3rd, 1671-1680.
- Kesson S.E. (1975) Mare basalts: Melting experiments and petrogenetic interpretations. Proc. Lunar Sci. Conf. 6th, 921-944.
- Kesson S.E. (1977) Mare basalt petrogenesis. Phil. Trans. R. Soc. Lond. A 285, 159-167.
- Khisina N.R., Petrishkova L.V., Taylor L.A., and Carpenter M.A. (1983) Thermal history of 15555 basalt based on pyroxene exsolution. Lunar Planet. Sci. XIV, 369-370.
- Kirsten T., Deubner J., Horn P., Kaneoka, I., Kiko J., Schaeffer O.A., and Thio S.K. (1972) The rare gas record of Apollo 14 and 15 samples. Proc. Lunar Sci. Conf. 3rd, 1865-1889.
- Kirsten T., Horn P., and Kiko J. (1973) Ar⁴⁰-Ar³⁹ dating of Apollo 16 and Apollo 15 rocks and rare gas analysis of Apollo 16 soils. Lunar Science IV, 438-440.
- Korekawa M. and Jagodzinski H. (1974) Peculiar features observed on surfaces of plagioclase crystals from the rock 15076,55. Lunar Science V, 425-427.
- Kothari B.K. and Goel P.S. (1972) Total nitrogen abundances in five Apollo 15 samples (Hadley-Apennine region) by neutron activation analysis. In The Apollo 15 Lunar Samples, 282-283.
- Kothari B.K. and Goel P.S. (1973) Nitrogen in lunar samples. Proc. Lunar Sci. Conf. 4th, 1587-1596.
- Kratschmer W. and Gentner N. (1975) The feasibility of ion identification on cosmic-ray tracks in lunar feldspars. Proc. Lunar Sci. Conf. 6th, 3577-3585.
- Kridelbaugh S.J., Grieve R.A.F., and Weill D.F. (1972) Glass compositions in breccias 15028 and 15059. In The Apollo 15 Lunar Samples, 123-127.
- Kushiro I. (1972) Petrology of some Apollo 15 mare basalts. In The Apollo 15 Lunar Samples, 128-130.
- Kushiro I. (1973) Crystallization of pyroxenes in Apollo 15 mare basalts. Carnegie Inst. Wash. Yr. Bk. 72, 647-650.

- Lakatos S. and Heymann D. (1972) Inert gases in green glass from Apollo 15. In The Apollo 15 Lunar Samples, 284-285.
- Lakatos S., Heymann D., and Yaniv A. (1973) Green spherules from Apollo 15: Inferences about their origin from inert gas measurements. The Moon, 7, 132-148.
- Lally J.S. Fisher R.M., Christie J.M., Griggs D.T., Hueur A.H., Nord G.L., Jr., and Radcliffe S.V. (1972) Electron petrography of Apollo 14 and 15 rocks. Proc. Lunar Sci. Conf. 3rd, 401-422.
- Laul J.C. and Schmitt R.A. (1972) Bulk and REE abundances in three Apollo 15 igneous rocks and six basaltic rake samples. In The Apollo 15 Lunar Samples, 225-228.
- Laul J.C. and Schmitt R.A. (1973) Chemical composition of Apollo 15, 16, and 17 samples. Proc. Lunar Sci. Conf. 4th, 1349- 1367.
- Laul J.C., Wakita H., and Schmitt R.A. (1972a) Bulk and REE abundances in anorthosites and noritic fragments. In The Apollo 15 Lunar Samples, 221-224.
- Laul J.C., Showalter D.L., and Schmitt R.A. (1972b) Elemental abundances of Apollo 15 four soils, a clod and five breccia rocks, and two soils of Apollo 16. In The Apollo 15 Lunar Samples, 229-232.
- Leich D.A., Tombrello T.A., and Burnett D.S. (1973) The depth distribution of hydrogen and fluorine in lunar samples. Proc. Lunar Sci. Conf. 4th, 1597-1612.
- Lightner B.D. and Marti K. (1974) Lunar trapped xenon. Lunar science V, 447-449.
- Lipschutz M.E., Balsiger H., Rey P., Pelly I.Z., and Mendia M.D. (1973) Vanadium isotopic composition and ferromagnesian element contents of three Apollo 15 samples. Proc. Lunar Sci. Conf. 4th, 1369-1378.
- Lofgren G., Donaldson C.H., Williams R.J., Mullins O., Jr., and Usselman T.M. (1974) Experimentally reproduced textures and mineral chemistry of Apollo 15 quartz normative basalt. Proc. Lunar Sci. Conf. 5th, 549-567.
- Lofgren G.E., Donaldson C.H., and Usselman T.M. (1975) Geology, petrology, and crystallization of Apollo 15 quartz-normative basalts. Proc. Lunar Sci. Conf. 6th, 79-99.
- Lofgren G.E., Grove T.L., Brown R.W., and Smith D.P. (1979) Comparison of dynamic crystallization techniques on Apollo 15 quartz normative basalts. Proc. Lunar Planet. Sci. Conf. 10th, 423-438.

- Longhi J., Walker D., Stolper E.N., Grove T.L., and Hays J.F. (1972) Petrology of mare/rille basalts 15555 and 15065. In The Apollo 15 Lunar Samples, 131-134.
- Longhi J., Walker D., and Hays J.F. (1976) Fe and Mg in plagioclase. Proc. Lunar Sci. Conf. 7th, 1281-1300.
- Longhi J., Walker D., and Hays J.F. (1978) The distribution of Fe and Mg between olivine and lunar basaltic liquids. Geochim. Cosmochim. Acta 42, 1545-1558.
- Lovering J.F. and Wark D.A. (1975) The lunar crust--chemically defined rock groups and their potassium-uranium fractionation. Proc. Lunar Sci. Conf. 6th, 1203-1217.
- LSPET (1972) Preliminary examination of lunar samples. The Apollo 15 Preliminary Science Report. NASA SP-289, 6-1 to 6-25.
- Lugmair G.W. (1975) Sm-Nd systematics of some Apollo 17 basalts. In Papers Presented to the Conference on Mare Basalts, LSI Contr. 234, 107-110. The Lunar Science Institute, Houston.
- Lugmair G.W. and Marti K. (1977) Evolution of the lunar interior: Sm-Nd systematics of Al5 green glass and the question of the lunar initial $^{143}\text{Nd}/^{144}\text{Nd}$. Lunar Science VIII, 597-599.
- Lugmair G.W. and Carlson R.W. (1978) The Sm-Nd history of KREEP. Proc. Lunar Planet. Sci. Conf. 9th, 689-704.
- Lugmair G.W. and Marti K. (1978) Lunar initial $^{143}\text{Nd}/^{144}\text{Nd}$: differential evolution of the lunar crust and mantle. Earth Planet. Sci. Lett. 39, 349-357.
- Lugmair G.W., Scheinin N.B., and Marti K. (1975) Sm-Nd age and history of Apollo 17 basalt 75075: Evidence for early differentiation of the lunar exterior. Proc. Lunar Sci. Conf. 6th, 1419-1429.
- Lugmair G.W., Kurtz J.P., Marti K., and Scheinin N.B. (1976) The low-Sm/Nd region of the Moon: evolution and history of a troctolite and a KREEP basalt. Lunar Science VII, 509-511.
- Lunar Sample Information Catalog Apollo 15 (1971) MSC 03209, Manned Spacecraft Center, Houston, 302 pp.
- Ma M.-S., Murali A.V., and Schmitt R.A. (1976) Chemical constraints for mare basalt genesis. Proc. Lunar Sci. Conf. 7th, 1673-1695.

- Ma M.-S., Schmitt R.A., Warner R.D., Taylor G.J., and Keil K. (1978) Genesis of Apollo 15 olivine normative basalts: Trace element correlations. Proc. Lunar Planet. Sci. Conf. 9th, 523-533.
- Ma M.-S., Liu Y.-G., and Schmitt R.A. (1981) A chemical study of individual green glasses and brown glasses from 15426: implications for their petrogenesis. Proc. Lunar Planet. Sci. Conf. 12th, 915-933.
- MacDougall D., Rajan R.S., Hutcheon I.D., and Price P.B. (1973) Irradiation history and accretionary processes in lunar and meteoritic breccias. Proc. Lunar Sci. Conf. 4th, 2319-2336.
- Mandeville J.C. (1975) Microcraters observed on 15015 breccia and micrometeoroid flux. Proc. Lunar Sci. Conf. 6th, 3403-3408.
- Mark R.K., Cliff R.A., Lee-Hu C., and Wetherill G.W. (1973) Rb-Sr studies of lunar breccias and soils. Proc. Lunar Sci. Conf. 9th, 1785-1795.
- Mark R.K., Lee-Hu C.-N., and Wetherill G.W., (1974) Equilibration and ages: Rb-Sr studies of breccias 14321 and 15265. Proc. Lunar Sci. Conf. 5th, 1477-1485.
- Marti K. and Lightner B.D. (1972) Rare gas record in the largest Apollo 15 rock. Science 175, 421-422.
- Mason B. (1972a) Lunar tridymite and cristobalite. Am. Min. 57, 1530-1535.
- Mason B. (1972b) Mineralogy and petrology of polymict breccia 15498. In The Apollo 15 Lunar Samples, 137-139.
- Mason B., Jarosewich E., Melson W.G., and Thompson G. (1972c) Mineralogy, petrology, and chemical composition of lunar samples 15085, 15256, 15271, 15471, 15474, 15476, 15535, 15555, and 15556. Proc. Lunar Sci. Conf. 3rd, 785-796.
- Maxwell J.A., Bouvier J.-L., and Wiik H.B. (1972) Chemical composition of some Apollo 15 lunar samples. In The Apollo 15 Lunar Samples, 233-238.
- McKay D.S. and Wentworth S.J. (1983) A petrographic survey of regolith breccias from the Apollo 15 and Apollo 16 collection. Lunar Planet. Sci. XIV, 481-482.
- McKay D.S., Morris R.V., and Wentworth S.J. (1984) Maturity of regolith breccias as revealed by ferromagnetic and petrographic indices. Lunar Planet. Sci. XV, 530-531.
- McKay G.A. and Weill D.F. (1976) Petrogenesis of KREEP. Proc. Lunar Sci. Conf. 7th, 2427-2447.

- Megrue G.H. (1972) In situ $^{40}\text{Ar}/^{39}\text{Ar}$ ages of breccia 14301, and concentration gradients of helium, neon, and argon isotopes in Apollo 15 samples. In The Apollo 15 Lunar Samples, 378-379.
- Megrue G.H. (1973a) Distribution of gases within Apollo 15 samples: implications for the incorporation of gases within soiled bodies of the solar system. J. Geophys. Res. 78, 4875-4883.
- Megrue G.H. (1973b) Solar activity, selenothermal, and selenotectonic events. Lunar Science IV, 515-516.
- Mehta S. and Goldstein J.I. (1979) Analytical electron microscopy study of submicroscopic metal particles in glassy constituents of lunar breccias 15015 and 60095. Proc. Lunar Planet. Sci. Conf. 10th, 1507-1521.
- Mehta S., Goldstein J.I., and Friel J.J. (1979) Investigations of submicron sized metal particles in glass coatings of lunar breccia 15286. Proc. Lunar Planet. Sci. Conf. 10th, 1523- 1530.
- Merlivat L., Lelu M., Nief G., and Roth E. (1974) Deuterium, hydrogen, and water content of lunar material. Proc. Lunar Sci. Conf. 5th, 1885-1895.
- Meyer C., Jr. (1979) Trace elements in plagioclase from the lunar highlands. In Papers Presented to the Conference on the Lunar Highlands Crust, Lunar and Planetary Institute, Houston, Contribution 394, 111-113.
- Meyer C., Jr., Anderson D.H., and Bradley J.G. (1974) Ion microprobe mass analysis of plagioclase from "non-mare" lunar samples. Proc. Lunar Sci. Conf. 5th, 685-706.
- Meyer C., Jr., McKay D.S., Anderson D.H., and Butler P., Jr. (1975) The source of sublimates on the Apollo 15 green and Apollo 17 orange glass samples. Proc. Lunar Sci. Conf. 6th, 1673-1699.
- Michel-Levy M.C. and Johan Z. (1973) Apollo 15 lunar rocks 15555, 15565, and 15505 and their associated glasses. Lunar Science IV, 136-137.
- Mizutani H. and Newbigging D.F. (1973) Elastic wave velocities of Apollo 14, 15, and 16 rocks. Proc. Lunar Sci. Conf. 4th, 2601-1609.
- Modzeleski J.E., Modzeleski V.E., Nagy L.A., Nagy B., Hamilton P.B., McEwan W.S., and Urey H.C. (1972) Carbon compounds in Apollo 15 lunar samples. In The Apollo 15 Lunar Samples, 311-315.
- Moore C.B. (1974) A check list of total carbon and sulfur analyses. Center for Meteorite Studies Contribution #94, Arizona State University, Tempe, Az.

- Moore C.B. and Lewis C.F. (1976) Total nitrogen contents of Apollo 15, 16, and 17 lunar rocks and breccias. Lunar Science VII, 571-573.
- Moore C.B., Lewis C.F., and Gibson E.K., Jr. (1972) Carbon and nitrogen in Apollo 15 lunar samples. In The Apollo 15 Lunar Samples, 316-318.
- Moore C.B., Lewis C.F., and Gibson E.K., Jr. (1973) Total carbon contents of Apollo 15 and 16 lunar samples. Proc. Lunar Sci. Conf. 4th, 1613-1623.
- Morawski A., Vaughan D.I., and Burns R.G. (1972) Crystal chemistry of zoned clinopyroxenes from lunar rock 15058. In The Apollo 15 Lunar Samples, 140-143.
- Morgan J.W., Krahenbuhl U., Ganapathy R., and Anders E. (1972a) Volatile and siderophile elements in Apollo 14 and 15 rocks. Lunar Science III, 555-557.
- Morgan J.W., Krahenbuhl U., Ganapathy R., and Anders E. (1972b) Trace elements in Apollo 15 samples: Implications for meteorite influx and volatile depletion on the moon. Proc. Lunar Sci. Conf. 3rd, 1361-1376.
- Morgan J.W., Ganapathy R., Higdri H., and Krahenbuhl U. (1976) Volatile and siderophile trace elements in anorthositic rocks from Fiskeraeset, West Greenland: comparison with lunar and meteoritic analogues. Geochim Cosmochim. Acta 40, 861-887.
- Morgan J.W. and Wandless G.A. (1984) Surface-correlated trace elements in 15426 lunar glasses. Lunar Planet. Sci. XV, 562-563.
- Morrison D.A., McKay D.S., Fruland R.M., and Moore H.J. (1973) Microcraters on Apollo 15 and 16 rocks. Proc. Lunar Sci. Conf. 4th, 3235-3253.
- Muan A., Lofall T., and Ma C.-B. (1974) Liquid-solid equilibria in lunar rocks from Apollo 15, 16 and 17, and phase relations in parts of the system $\text{CaMgSi}_2\text{O}_6$ - $\text{CaFeSi}_2\text{O}_6$ - Fe_2SiO_4 - $\text{CaAl}_2\text{Si}_2\text{O}_8$. Lunar Science V, 529-530.
- Muller O. (1972a) Alkali and alkaline earth elements, La and U in Apollo 14 and Apollo 15 samples. In The Apollo 15 Lunar Samples, 240-243.
- Muller O. (1972b) Chemically bound nitrogen abundances in lunar samples, and active gases released by heating at lower temperatures (250 to 500° C). Proc. Lunar Sci. Conf. 3rd, 2059-2068.
- Muller O. (1975) Lithophile trace and major elements in Apollo 16 and 17 lunar samples. Proc. Lunar Sci. Conf. 6th, 1303-1311.

- Muller O., Grallath E., and Tolg G. (1976) Nitrogen in lunar igneous rocks. Proc. Lunar Sci. Conf. 7th, 1615-1622.
- Murali A.V., Ma M.-S., Laul J.C., and Schmitt R.A. (1977) Chemical composition of breccias, feldspathic basalt and anorthosites from Apollo 15 (15308, 15359, 15382 and 15362), Apollo 16 (60018 and 65785), Apollo 17 (72435, 72536, 72559, 72735, 72738, 78526 and 78527) and Luna 20 (22012 and 22013). Lunar Science VIII, 700-702.
- Murthy V.R. and Banerjee S.K. (1973) Lunar evolution: how well do we know it now? Moon, 7, 149-171.
- Murthy V.R., Evensen N.M., Jahn B.-M., and Coscio M.R., Jr. (1972a) Apollo 14 and 15 samples: Rb-Sr ages, trace elements, and lunar evolution. Proc. Lunar Sci. Conf. 3rd, 1503-1514.
- Murthy V.R., Evensen N.M., Jahn B.-M., Coscio M.R., Jr., Dragon J.C., and Pepin R.O. (1972b) Rubidium-strontium and potassium-argon age of lunar sample 15555. Science 175, 419-421.
- Nagata T., Fisher R.M., Schwerer F.C., Fuller M.D., and Dunn J.R. (1972a) Summary of rock magnetism of Apollo 15 lunar materials. In The Apollo 15 Lunar Samples, 442-445.
- Nagata T., Fisher R.M., Schwerer F.C., Fuller M.D., and Dunn J.R. (1972b) Rock magnetism of Apollo 14 and 15 materials. Proc. Lunar Sci. Conf. 3rd, 2423-2447.
- Nagata T., Fisher R.M., Schwerer F.C., Fuller M.D., and Dunn J.R. (1973) Magnetic properties and natural remanent magnetization of Apollo 15 and 16 lunar materials. Proc. Lunar Sci. Conf. 4th, 3019-3043.
- Nagata T., Fisher R.M., and Schwerer F.C. (1974) Some characteristic magnetic properties of lunar materials. The Moon 9, 63-77.
- Nagata T., Fisher R.M., Schwerer F.C., Fuller M.D., and Dunn J.R. (1975) Effects of meteorite impact: on magnetic properties of Apollo lunar materials. Proc. Lunar Sci. Conf. 6th, 3111-3122.
- Nagel K., Neukum G., Dohnanyi J.S., Fechtig H., and Gentner W. (1976) Density and chemistry of interplanetary dust particles, derived from measurements of lunar microcraters. Proc. Lunar Sci. Conf. 7th, 1021-1029.
- Nagle J.S. (1981) Apollo 15 green glass: a mare margin deposit. Lunar Planet. Sci. XII, 750-752.

- Nagle J.S. (1982a) Evidence of subcrater lithification and hot ejecta deposition in lunar polymict regolith breccias and achondrites. Lunar Planet. Sci. XIII, 568-569.
- Nagle J.S. (1982b) Subcrater lithification of polymict regolith breccias. Lunar Planet. Sci. Conf. 13, JGR 87 Supplement, A131-A146.
- Nakamura N., Unruh D.H., Gensho R., Tatsumoto M. (1977) Evolution history of lunar mare basalts: Apollo 15 samples revisited. Lunar Science VIII, 712-713.
- Nakazawa H. and Hafner S.S. (1976) X-ray diffraction profiles and exsolution history of pigeonite. Proc. Lunar Sci. Conf. 7th, 1865-1873.
- Nava D.F. (1974) Chemical compositions of some soils and rock types from the Apollo 15, 16, and 17 lunar sites. Proc. Lunar Sci. Conf. 5th, 1089-1096.
- Nava D.F., Winzer S.R., Lindstrom D.J., Meyerhoft M., Lum R.K.L., Schumann P.J., Lindstrom M.M., and Philpotts J.A. (1977) Rind glass and breccia: a study of lunar sample 15255. Lunar Science VIII, 720-722.
- Nehru C.E., Prinz M., Dowty E., and Keil K. (1973) Electron microprobe analyses of spinel group minerals and ilmenite in Apollo 15 rake samples of igneous origin. Univ. New Mexico Inst. of Meteoritics, Sp. Pub. #10, 91 pp.
- Nehru C.E., Prinz M., Dowty E., and Keil K. (1974) Spinel-group minerals and ilmenite in Apollo 15 rake samples. Am. Min. 59, 1220-1235.
- Niebuhr H.H., Zeira S., and Hafner S.S. (1973) Ferric iron in plagioclase crystals from anorthosite 15415. Proc. Lunar Sci. Conf. 4th, 971-982.
- Nord G.L., Jr., Lally J.S., Heuer A.H., Christie J.M., Radcliffe S.V., Griggs D.T., and Fisher R.M. (1973) Petrologic study of igneous and metaigneous rocks from Apollo 15 and 16 using high voltage transmission electron microscopy. Proc. Lunar Sci. Conf. 4th, 953-970.
- Nord G.L., Jr., Christie J.M., Lally J.S., and Heuer A.H. (1977) The thermal and deformational history of Apollo 15418, a partly shock-melted lunar breccia. The Moon 17, 217-231.
- Nunes P.D., Tatsumoto M., Knight R.J., Unruh D.M., and Doe B.R. (1973) U-Th-Pb systematics of some Apollo 16 lunar samples. Proc. Lunar Sci. Conf. 4th, 1797-1822.
- Nunes P.D., Tatsumoto M., and Unruh D.M. (1975) U-Th-Pb systematics of anorthositic gabbros 78155 and 77017 -- implications for early lunar evolution. Proc. Lunar Sci. Conf. 6th, 1431-1444.

- Nyquist L.E., Hubbard N.J., Gast P.W., Church S.E., Bansal B.M., and Wiesmann H. (1972a) Rb-Sr systematic for chemically defined Apollo 14 breccias. Proc. Lunar Sci. Conf. 3rd, 1515-1530.
- Nyquist L.E., Gast P.W., Church S.E., Wiesmann H., and Bansal B. (1972b) Rb-Sr systematics for chemically defined Apollo 15 materials. In The Apollo 15 Lunar Samples, 380-384.
- Nyquist L.D., Hubbard N.J., Gast P.W., Bansal B.M., Wiesmann H., and Jahn B. (1973) Rb-Sr systematics for chemically defined Apollo 15 and 16 materials. Proc. Lunar Sci. Conf. 4th, 1823-1846.
- Nyquist L.E., Bansal B.M., Wiesmann H., and Jahn B.-M. (1974) Taurus-Littrow chronology: Some constraints on early lunar crustal development. Proc. Lunar Sci. Conf. 5th, 1515-1539.
- Nyquist L.E., Bansal B.M., and Wiesmann H. (1975) Rb-Sr ages and initial $^{87}\text{Sr}/^{86}\text{Sr}$ for Apollo 17 basalts and KREEP basalt 15386. Proc. Lunar Sci. Conf. 6th, 1445-1465.
- Nyquist L.E., Wiesmann H., Shih C.-Y., and Bansal B.M. (1977) REE and Rb-Sr analysis of 15405 quartz-monzodiorite (Super-KREEP). Lunar Science VIII, 738-740.
- Nyquist L.E., Reimold W.U., Bogard D.D., Wooden J.L., Bansal B.M., Wiesmann H., and Shih C.-Y. (1981) A comparative Rb-Sr, Sm-Nd, and K-At study of shocked norite 78236: Evidence of slow cooling in the lunar crust? Proc. Lunar Planet. Sci. Conf. 12th, Part B, 67-97.
- Nyquist L.E., Wiesmann H., Wooden J., Bansal B., and Shih C.-Y. (1979) Age and REE abundances of anorthositic norite from 15455 (Abs.). In Papers Presented to the Conference on the Lunar Highlands Crust. LPI Contrib. 394, 122-124.
- Nyquist L.E., Reimold W.U., Wooden J.L., Bansal B.M., Wiesmann H., and Shih C.-Y. (1981) Sr and Nd cooling ages of cumulate norite 78236. Lunar and Planetary Science XII, 782-784.
- O'Hara M.J. and Humphries D.J. (1977) Problems of iron gain and loss during experimentation on natural rocks: the experimental crystallization of fine lunar basalts at low pressures. Phil. Trans. R. Soc. Lond. A 286, 313-330.
- O'Keefe J.D. and Ahrens T.J. (1975) Shock effects from a large impact on the Moon. Proc. Lunar Sci. Conf. 6th, 2831-2844.

- O'Kelley G.D., Eldridge J.S., and Northcutt K.J. (1972a) Abundances of the primordial radioelements K, Th, and U in Apollo 15 samples, as determined by non-destructive gamma-ray spectrometry. In The Apollo 15 Lunar Samples, 244-246.
- O'Kelley G.D., Eldridge J.S., Northcutt K.J., and Schonfeld E. (1972b) Primordial radioelements and cosmogenic radionuclides in lunar samples from Apollo 15. Proc. Lunar Sci. Conf. 3rd, 1659-1670.
- O'Kelley G.D., Eldridge J.S., Schonfeld E., and Northcutt K.J. (1972c) Primordial radioelements and cosmogenic radionuclides in lunar samples from Apollo 15. Science 175, 440-443.
- O'Kelley G.D., Eldridge J.S., Northcutt K.J., and Schonfeld E. (1976) Radionuclide concentrations in KREEP basalt samples 15382 and 15386. Lunar Science VII, 651-652.
- Onorato P.I.K., Uhlmann D.R., Taylor L.A., Coish R.A., and Gamble R.P. (1978) Olivine cooling speedometers. Proc. Lunar Planet. Sci. Conf. 9th, 613-628.
- Onorato P.I.K., Yinnon H., Uhlmann D.R., and Taylor L.A. (1979) Partitioning as a cooling rate indicator. Proc. Lunar Planet. Sci. Conf. 10th, 479-491.
- Palme H., Spettel B., Wanke H., Bischoff A., and Stoffler D. (1984a) The evolution of the lunar magma ocean: evidence from trace elements in plagioclase. Lunar Planet. Sci. XV, 625- 627.
- Palme H. and others (1984b) Plagioclase, Proc. Lunar Planet. Sci. Conf. 15th, in press.
- Papanastassiou D.A. and Wasserburg G.J. (1973) Rb-Sr ages and initial strontium in basalts from Apollo 15. Earth Planet. Sci. Lett. 17, 324-337.
- Papanastassiou D.A. and Wasserburg G.J. (1976a) Early lunar differentiates and lunar initial $^{87}\text{Sr}/^{86}\text{Sr}$. Lunar Science VII, 665-667.
- Papanastassiou D.A. and Wasserburg G.J. (1976b) Rb-Sr age of troctolite 76535. Proc. Lunar Sci. Conf. 7th, 2035-2054.
- Papanastassiou D.A., DePaolo D.J., Tera F., and Wasserburg G.J. (1977) An isotopic triptych on mare basalts: Rb-Sr, Sm-Nd, U-Pb. Lunar Science VIII, 750-752
- Papike J.J., Bence A.E., and Ward M.A. (1972) Subsolidus relations of pyroxenes from Apollo 15 basalts. In The Apollo 15 Lunar Samples, 144-148.
- Papike J.J., Hodges F.N., Bence A.E., Cameron M., and Rhodes J.M. (1976) Mare basalts: Crystal chemistry, mineralogy, and petrology. Reviews of Geophysics and Space Physics 14, 475-540.

- Pearce G.W., Strangway D.W., and Gose W.A. (1972) Remanent magnetization of the lunar surface. Proc. Lunar Sci. Conf. 3rd, 2449-2464.
- Pearce G.W., Gose W.A., and Strangway D.W. (1973) Magnetic studies on Apollo 15 and 16 lunar samples. Proc. Lunar Sci. Conf. 4th, 3045-3076.
- Pearce G.W., Hoyer G.S., Strangway D.W., Walker B.M., and Taylor L.A. (1976) Some complexities in the determination of lunar paleointensities. Proc. Lunar Sci. Conf. 7th, 3271-3294.
- Peckett A., Phillips R., and Brown G.M. (1972) New zirconium-rich minerals from Apollo 14 and 15 lunar rocks. Nature 236, 215- 217.
- Pepin R.O., Basford J.R., Dragon R.C., Coscio M.R., Jr., and Murthy V.R. (1974) Rare gases and trace elements in Apollo 15 drill core fines: depositional chronologies and K-Ar ages, and production rates of spallation-produced ^3He , ^{21}Ne , and ^{38}Ar versus depth. Proc. Lunar Sci. Conf. 5th, 2149-2184.
- Perry C.H. and Lowndes R.P. (1972) Infrared studies of Apollo 15 fines. In The Apollo 15 Lunar Samples, 482-485.
- Perry C.H., Agrawal D.K., Anastassakis E., Lowndes R.P., and Tornberg N.E. (1972) Far infrared and Raman spectroscopic investigations of lunar materials from Apollo 11, 12, 14, and 15. Proc. Lunar Sci. Conf. 3rd, 3077-3095.
- Phinney W.C., Warner J.L., Simonds C.H., and Lofgren G.E. (1972) Classification and distribution of rock types at Spur Crater. In The Apollo 15 Lunar Samples, 149-153.
- Phinney W.C., Warner J.L., and Simonds C.H. (1977) Lunar highland rock types: Their implications for impact-induced fractionation. In The Soviet-American Conference on the Cosmochemistry of the Moon and Planets, NASA SP-370, 91-126.
- Philpotts J.A., Schuhmann S., Koons C.W., Lum R.K.L., Bickel A.L., and Schnetzler C.C. (1973) Apollo 16 returned lunar samples: Lithophile trace-element abundances. Proc. Lunar Sci. Conf. 4th, 1427-1436.
- Plieninger T. and Schaeffer O.A. (1976) Laser probe ^{39}Ar - ^{40}Ar ages of individual mineral grains in lunar basalt 15607 and lunar breccia 15465. Proc. Lunar Sci. Conf. 7th, 2055-2066.
- Podosek F.A. and Huneke J.C. (1973) Argon in Apollo 15 green glass spherules (15426): ^{40}Ar - ^{39}Ar age and trapped argon. Earth Planet. Sci. Lett. 19, 413-421.

- Podosek F.A., Huneke J.C., and Wasserburg G.J. (1972) Gas retention and cosmic ray exposure ages of lunar rock 15555. Science 175, 423-425.
- Poupeau G., Pellas P., Lorin J.C., Chetrit G.C., and Berdot J.L. (1972) Track analysis of rocks 15058, 15555, 15641, and 14307. In The Apollo 15 Lunar Samples, 385-387.
- Pratt D.D., Moore C.B., Parsons M.L., and Anderson D.L. (1977) Applications of a new logical search on the lunar data base for use in pattern recognition classification of Apollo 15 mare basalts. Proc. Lunar Sci. Conf. 8th, 1839-1847.
- Price P.B., Chan J.H., Hutcheon I.D., MacDougall D., Rajan R.S., Shirk E.K., and Sullivan J.D. (1973) Low-energy heavy ion in the solar system. Proc. Lunar Sci. Conf. 4th, 2347-2361.
- Price P.B., Hutcheon I.D., Braddy D., and MacDougall D. (1975) Track studies bearing on solar-system regoliths. Proc. Lunar Sci. Conf. 6th, 3449-3469.
- Prinz M., Dowty E., Keil K., Andersen C.A., and Hinthorne J.R. (1973) Ion microprobe study of high-alumina basaltic glasses. Lunar science IV, 603-605.
- Rajan R.S., Brownlee D.E., and Horz F. (1974) The ancient micrometeorite flux. Lunar Science V, 616-617.
- Rancitelli L.A., Perkins R.W., Felix W.D., and Wogman N.A. (1972) Lunar surface processes and cosmic ray characterization from Apollo 12-15 lunar sample analyses. Proc. Lunar Sci. Conf. 3rd, 1681-1691.
- Reed G.W., Jr. and Jovanovic S. (1972) Trace element comparisons between mare and Apennine Front nonmare samples. In The Apollo 15 Lunar Samples, 247-249.
- Reed G.W., Jr., Allen R.O., Jr., and Jovanovic S. (1977) Volatile metal deposits on lunar soils--relation to volcanism. Proc. Lunar Sci. Conf. 8th, 3917-3930.
- Reid A.M., Duncan A.R., and Richardson S.H. (1977) In search of LKFM. Proc. Lunar Sci. Conf. 8th, 2321-2338.
- Rhodes J.M. (1972) Major element chemistry of Apollo 15 mare basalts. In The Apollo 15 Lunar Samples, 250-252.
- Rhodes J.M. and Blanchard D.P. (1983) New analyses of mare basalts. Lunar Planet. Sci. XIV, 640-641.
- Rhodes M.J. and Hubbard N.J. (1973) Chemistry, classification, and petrogenesis of Apollo 15 mare basalts. Proc. Lunar Sci. Conf. 4th, 1127-1148.

- Richter D., Simmons G., and Siegfried R. (1976) Microcracks, micropores, and their petrologic interpretation for 72415 and 15418. Proc. Lunar Sci. Conf. 7th, 1901-1923.
- Ridley W.I. (1975) Petrology of Apollo 15 breccia 15459. Lunar Science VI, 671-673.
- Ridley W.I. (1977) Some petrological aspects of Imbrium stratigraphy. Phil. Trans. R. Soc. Lond. A 285, 105-114.
- Ridley W.I. and Adams M. (1976) Petrologic studies of poikiloblastic textured rocks. Lunar Science VII, 739-740.
- Ridley W.I., Hubbard N.J., Rhodes J.M., Weismann H., and Bansal B. (1973a) The petrology of lunar breccia 15445 and petrogenetic implications. J. Geol. **81**, 621-631.
- Ridley W.I., Reid A.M., Warner J.L., and Brown R.W. (1973b) Apollo 15 green glasses. Phys. Earth Planet. Interiors, **7**, 133-136.
- Roedder E. and Weiblen P.W. (1972) Petrographic features and petrologic significance of melt inclusions in Apollo 14 and 15 rocks. Proc. Lunar Sci. Conf. 3rd, 251-279.
- Roedder E. and Weiblen P.W. (1977) Compositional variation in late-stage differentiates in mare lavas, as indicated by silicate melt inclusions. Proc. Lunar Sci. Conf. 8th, 1767-1783.
- Rose H.J., Jr., Baedeker P.A., Berman S., Christian R.P., Dwornik E.J., Finkelman R.B., and Schnepfe M.M. (1975) Chemical composition of rocks and soils returned by the Apollo 15, 16, and 17 missions. Proc. Lunar Sci. Conf. 6th, 1363-1373.
- Rosholt J.N. (1974) Isotopic composition of thorium in lunar samples. Lunar Science V, 648-650.
- Rosholt J.N. and Tatsumoto M. (1973) Isotopic composition of Uranium, Thorium, and Protactinium. Lunar Science IV, 634-636.
- Rutherford M.J., Hess P.C., Ryerson F.J., Campbell H.W., and Dick P.A. (1976) The chemistry, origin and petrogenetic implications of lunar granite and monzonite. Proc. Lunar Sci. Conf. 7th, 1723-1740.
- Rutherford M.J., Dixon S., and Hess P. (1980) Ilmenite saturation at high pressure in KREEP basalts: origin of KREEP and hi-TiO₂ mare basalts. Lunar Planet. Sci. XI, 966-967.
- Ryder G. (1975) Lunar sample 15405: remnant of a KREEP basalt-granite differentiated pluton. Earth Planet. Sci. Lett. **29**, 255-268.

- Ryder G. and Bower J.F. (1977) Petrology of Apollo 15 black-and-white rocks 15445 and 15455--Fragments of the Imbrium melt sheet? Proc. Lunar Sci. Conf. 8th, 1895-1923.
- Ryder G. and Norman M. (1979) Catalog of pristine non-mare materials Part I. Non-anorthosites. Revised. NASA Lyndon B. Johnson Space Center, JSC-14565.
- Sato M., Hickling N.L., and McLane J.E. (1973) Oxygen fugacity values of Apollo 12, 14, and 15 lunar samples and reduced state of lunar magmas. Proc. Lunar Sci. Conf. 4th, 1061-1079.
- Schaal R.B. and Horz F. (1977) Shock metamorphism of lunar and terrestrial basalts. Proc. Lunar Sci. Conf. 8th, 1697-1729.
- Schaeffer G.A. and Schaeffer O.A. (1977) ^{39}Ar - ^{40}Ar ages of lunar rocks. Proc. Lunar Sci. Conf. 8th, 2253-2300.
- Schaeffer O.A., Plieninger T., and Hartung J.B. (1976) Spatial distribution of rare gases in lunar breccia 15426 and the exposed glass surface of rock 15205. Lunar Science VII, 770-772.
- Schneider E., Storzer D., and Fechtig H. (1972) Exposure ages of Apollo 15 samples by means of microcrater statistics and solar flare particle tracks. In The Apollo 15 Lunar Samples, 415-419.
- Schneider E., Storzer D., Mehl A., Hartung J.B., Fechtig H., and Gentner W. (1973a) Microcraters on Apollo 15 and 16 samples and corresponding cosmic dust fluxes. Lunar Science IV, 656-657.
- Schneider E., Storzer D., Hartung J.B., Fechtig A., and Gentner W. (1973b) Microcraters on Apollo 15 and 16 samples and corresponding cosmic dust fluxes. Proc. Lunar Sci. Conf. 4th, 3277-3290.
- Schnetzler C.C., Philpotts J.A., Nava D.F., Schuhmann S., and Thomas H.H. (1972) Geochemistry of Apollo 15 basalt 15555 and soil 15531. Science 175, 426-428.
- Schonfeld E. (1975a) Component abundances in Apollo 15 soils and breccias by the mixing model technique. Lunar Science VI, 712-714.
- Schonfeld E. (1975b) A model for the lunar anorthositic gabbro. Proc. Lunar Planet. Sci. 6th, 1375-1384.
- Schonfeld E., O'Kelley G.D., Eldridge J.S., and Northcutt K.J. (1972) K, U, and Th concentrations in rake sample 15382 by non-destructive gamma-ray spectroscopy. In The Apollo 15 Lunar Samples, 253-254.

- Schurmann K. and Hafner S.S. (1972) On the amount of ferric iron in plagioclases from lunar igneous rocks. Proc. Lunar Sci. Conf. 3rd, 615-621.
- Schwerer F.C. and Nagata T. (1976) Ferromagnetic-superparamagnetic granulometry of lunar surface materials. Proc Lunar Sci. Conf. 7th, 759-778.
- Schwerer F.C., Huffman G.P., Fisher R.M., and Nagata T. (1973) Electrical conductivity of lunar surface rocks at elevated temperatures. Proc. Lunar Sci. Conf. 4th, 3151-3166.
- Schwerer F.C., Huffman G.P., Fisher R.M., and Nagata T. (1974) Electrical conductivity of lunar surface rocks: Laboratory measurements and implications for lunar interior temperatures. Proc. Lunar Sci. Conf. 5th, 2673-2687.
- Sewell D.K.B., Gleadow A.J.W., Britten R., Cundari A., and Lovering J.F. (1974) Composition of rock clasts and their constituent minerals from Apollo 14 and 15 lunar breccias. Dept. of Geol. Univ. Melbourne, Pub #2.
- Shih, C.-Y., Nyquist, L.E., Dasch, E.J., Bogard, D.D., Bansal, M., and Wiesmann, H. (1993) Ages of pristine noritic clasts from lunar breccias 15445 and 15455. Geochim. Cosmochim. Acta 57, 915-931.
- Silver L.T. (1972) Uranium-thorium-lead isotopes and the nature of the mare surface debris at Hadley-Apennine. In The Apollo 15 Lunar Samples, 388-390.
- Silver L.T. (1973) Uranium-thorium-lead isotope relations in the remarkable debris blanket at Hadley-Apennine. Lunar science IV, 669-671.
- Silver L.T. (1976) Implications of major mineral fractionation of thorium and uranium in some lunar materials. Lunar Science VII, 809-811.
- Simmons G., Siegfried R., and Richter D. (1975) Characteristics of microcracks in lunar samples. Proc. Lunar Sci. Conf. 6th, 3227-3254.
- Simonds C.H., Warner J.L., and Phinney W.C. (1975) The petrology of the Apennine Front revisited. Lunar Science VI, 744-746.
- Simoneit B.R., Christiansen P.C., and Burlingame A.L. (1973) Volatile element chemistry of selected lunar, meteoritic, and terrestrial samples. Proc. Lunar Sci. Conf. 4th, 1635-1650.
- Smith J.V. and Steele I.M. (1974) Intergrowths in lunar and terrestrial anorthosites with implications for lunar differentiation. Am. Min. 59, 673-680.

- Smith J.V., Hansen E.C., and Steele I.M. (1980) Lunar highland rocks: element partitioning among minerals II: electron microprobe analyses of Al, P, Ca, Ti, Cr, Mn, and Fe in olivine. Proc. Lunar Planet. Sci. Conf. 11th, 555-569.
- Spangler R.R. and Delano J.W. (1984) History of the Apollo 15 yellow impact glass and sample 15426 and 15427. Proc. Lunar Planet. Sci. Conf. 14, JGR 89 Supplement, B478-486.
- Spangler R.R., Warasila R., and Delano J.W. (1984) ^{39}Ar - ^{40}Ar ages for the Apollo 15 green and yellow volcanic glasses. Proc. Lunar Planet. Sci. Conf. 14, JGR 89 Supplement, B487-B497.
- Steele I.M. and Smith J.V. (1971) Mineralogy of Apollo 15415 "Genesis Rock:" source of anorthosite on the Moon. Nature 234, 138-140.
- Steele I.M. and Smith J.V. (1975) Minor elements in lunar olivine as a petrologic indicator. Proc. Lunar Sci. Conf. 6th, 451-467.
- Steele I.M., Smith J.V., and Grossman L. (1972a) Mineralogy and Petrology of Apollo 15 rake samples: I. Basalts. In The Apollo 15 Lunar Samples, 158-160.
- Steele I.M., Smith J.V., and Grossman (1972b) Mineralogy and Petrology of Apollo 15 rake samples: II. Breccias. In The Apollo 15 Lunar Samples, 161-164.
- Steele I.M., Smith J.V., and Irving A.J. (1974) Mineralogical studies of crustal rocks--anorthosites; norites; armalcolite and ilmenite. Lunar Science V, 729-731.
- Steele I.M., Irving A.J., and Smith J.V. (1977) Apollo 15 breccia rake samples--mineralogy of lithic and mineral clasts. Proc. Lunar Sci. Conf. 8th, 1925-1941.
- Steele I.M., Hutcheon I.D., and Smith J.V. (1980) Ion microprobe analysis and petrogenetic interpretations of Li, Mg, Ti, K, Sr, Ba in lunar plagioclase. Proc. Lunar Planet. Sci. Conf. 11th, 571-590.
- Steele I.M. and Smith J.V. (1979) Trace elements in highland plagioclase: Ion probe analyses of Li, Mg, Na, Mg, Ti, Sr and Ba. In Papers Presented to the Conference on the Lunar Highlands Crust, Lunar and Planetary Institute, Houston, Contribution 394, 160-162.
- Stettler A., Eberhardt P., Geiss J., Grogler N., and Maurer P. (1973) Ar^{39} - Ar^{40} ages and Ar^{37} - Ar^{38} exposure ages of lunar rocks. Proc. Lunar Sci. Conf. 4th, 1865-1888.
- Stewart D.B., Ross M., Morgan B.A., Appleman D.E., Huebner J.S., and Commeau R.F. (1972) Mineralogy and petrology of lunar anorthosite 15415. Lunar Science III, 726-728.

- Stoffler D., Knoll H.-D., Marvin U.B., Simonds C.H., and Warren P.W. (1980) Recommended classification and nomenclature of lunar highlands rocks--a committee report. Proc. Conf. Lunar Highlands Crust, 51-70.
- Stone C.D., Taylor L.A., McKay D.S., and Morris R.V. (1982) Ferromagnetic resonance intensity: a rapid method for determining lunar glass bead origin. Proc. Lunar Planet. Sci. Conf. 13th, JGR 87 Supplement, A182-A196.
- Storzer D., Poupeau G., and Kratschmer W. (1973) Track-exposure and formation ages of some lunar samples. Proc. Lunar Sci. Conf. 4th, 2363-2377.
- Strasheim A., Coetzee J.H.J., Jackson P.F.S., Strelow F.W.E., Wybenga A.J., Gricius A.J., and Kokot M.L. (1972) Analysis of lunar samples 15065, 15301, and 15556 with isotopic data for $^7\text{Li}/^6\text{Li}$. In The Apollo 15 Lunar Samples, 257-259.
- Stroube W.B., Jr., Ali M.Z., and Ehmann W.D. (1977) A chemical study of Apollo 15 glass-coated rock 15465 and green glass from soil 15301. Lunar Science VIII, 917-918.
- Sugiura N. and Strangway D.W. (1983) Magnetic paleointensity determination on lunar sample 62235. Proc. Lunar Planet. Sci. Conf. 13th, JGR 88 Supplement, A684-A690.
- Sutton R.L., Hait M.H., Larson K.B., Swann G.A., Reed V.S., and Schaber G.G. (1972) Documentation of Apollo 15 samples. Interagency Report: Astrogeology 47, U.S.G.S.
- Takeda H. (1973) Inverted pigeonites from a clast of rock 15459 and basaltic achondrites. Proc. Lunar Sci. Conf. 3rd, 875-885.
- Takeda H. and Ishii T. (1975) Typical processes of exsolution, decomposition and inversion of pyroxenes and its bearing on thermal history of lunar rocks. Lunar Science VI, 795-797.
- Takeda H., Miyamoto M., Ishii T., and Lofgren G.E. (1975) Relative cooling rates of mare basalts at the Apollo 12 and 15 sites as estimated from pyroxene exsolution data. Proc. Lunar Sci. Conf. 6th, 987-996.
- Takeda H., Miyamoto M., Duke M.B., and Ishii T. (1978) Crystallization of pyroxenes in lunar KREEP basalt 15386 and meteoritic basalts. Proc. Lunar Planet. Sci. Conf. 9th, 1157-1171.
- Takeda H., Miyamota M., and Ishii T. (1980) Comparison of basaltic clasts in lunar and eucritic polymict breccias. Proc. Lunar Planet. Sci. Conf. 11th, 135-147.

- Takeda H., Mori H., Ishii T., and Miyamoto M. (1981) Thermal and impact histories of pyroxenes in lunar eucrite-like gabbros and eucrites. Proc. Lunar Planet. Sci. Conf. 12th, 1297-1313.
- Takeda H., Mori H., Miyamoto M., and Ishii T. (1984) Mesostasis-rich lunar and eucritic basalts with reference to REE-rich minerals. Lunar Planet. Sci. XV, 842-843.
- Tatsumoto M. and Unruh D.M. (1976) KREEP basalt age: grain by grain U-Th-Pb systematics study of the quartz monzodiorite clast 15405,88. Proc. Lunar Sci. Conf. 7th, 2107-2129.
- Tatsumoto M., Hedge C.E., Knight R.J., Unruh D.M., and Doe B.R. (1972) U-Th-Pb, Rb-Sr, and K measurements on some Apollo 15 and Apollo 16 samples. In The Apollo 15 Lunar Samples, 391-395.
- Taylor L.A. and McCallister R.H. (1972a) An experimental investigation of the significance of zirconium partitioning in lunar ilmenite and ulvospinel. Earth Planet. Sci. Lett. 17, 105-109.
- Taylor L.A. and McCallister R.H. (1972b) Opaque mineralogy of Apollo 15 rocks: Experimental investigations of elemental partitionings and subsolidus reduction. In The Apollo 15 Lunar Samples, 169-173.
- Taylor L.A. and Misra K.C. (1975) Pyroxene-phyric basalt 15075: Petrography and petrogenesis. Proc. Lunar Sci. Conf. 6th, 165-179.
- Taylor L.A., McCallister R.H., and Sardi O. (1973) Cooling histories of lunar rocks based on opaque mineral geothermometers. Proc. Lunar Sci. Conf. 4th, 819-828.
- Taylor L.A., Uhlmann D.R., Hopper R.W., and Misra K.C. (1975a) Absolute cooling rates of lunar rocks based on the kinetics of Zr diffusion in opaque oxides: Applications to Apollo 15 rocks from Elbow Crater. Lunar Science VI, 798-800.
- Taylor L.A., Uhlmann D.R., Hopper R.W., and Misra K.C. (1975b) Absolute cooling rates of lunar rocks: theory and application. Proc. Lunar Sci. Conf. 6th, 181-191.
- Taylor L.A., Onorato P.I.K., and Uhlmann D.R. (1977) Cooling rate estimations based on kinetic modelling of Fe-Mg diffusion in olivine. Proc. Lunar Sci. Conf. 8th, 1581-1592.
- Taylor S.R. (1973) Geochemistry of the Lunar Highlands. The Moon 7, 181-195.
- Taylor S.R., Gorton M., Muir P., Nance W., Rudowski R., and Ware N. (1972) Composition of the Lunar Highlands II The Apennine Front. In The Apollo 15 Lunar Samples, 262-264.

- Taylor S.R., Gorton M.P., Muir P., Nance W., Rudowski R., and Ware N. (1973) Lunar highlands composition: Apennine Front. Proc. Lunar Sci. Conf. 4th, 1445-1459.
- Tera F. and Wasserburg G.J. (1974) U-Th-Pb systematics on lunar rocks and inferences about lunar evolution and the age of the Moon. Proc. Lunar Sci. Conf. 5th, 1571-1599.
- Tera F. and Wasserburg G.J. (1975) The evolution and history of mare basalts as inferred from U-Th-Pb systematics. Lunar Science VI, 807-809.
- Tera F. and Wasserburg G.J. (1976) Lunar ball games and other sports. Lunar Science VII, 858-860.
- Tera F., Ray L.A., and Wasserburg G.J. (1972) Distribution of Pb-U-Th in lunar anorthosite 15415 and inferences about its age. In The Apollo 15 Lunar Samples, 396-401.
- Tera F., Papanastassiou D.A., and Wasserburg G.J. (1974) The lunar time scale and a summary of isotopic evidence for a terminal lunar cataclysm. Lunar Science V, 792-794.
- Thiemens M.H. and Clayton R.N. (1979) Ancient solar wind in lunar microbreccias. Lunar Planet. Sci. X, 1222-1224.
- Thiemens M.H. and Clayton R.N. (1980) Ancient solar wind in lunar microbreccias. Earth Planet. Sci. Lett. 47, 34-42.
- Thode H.G. and Rees C.E. (1972) Sulphur concentrations and isotope ratios in Apollo 14 and 15 samples. In The Apollo 15 Lunar Samples, 402-403.
- Tittmann B.R., Abdel-Gawad M., and Housley R.M. (1972a) Elastic velocity and Q factor measurements on Apollo 12, 14, and 15 rocks. Proc. Lunar Sci. Conf. 3rd, 2565-2575.
- Tittmann B.R., Housley R.M., Cirlin E.H., and Abdel-Gawad M. (1972b) Rayleigh wave studies of two Apollo 15 rocks. In The Apollo 15 Lunar Samples, 462-465.
- Todd T., Wang H., Baldrige W.S., and Simmons G. (1972) Elastic properties of Apollo 14 and 15 rocks. Proc. Lunar Sci. Conf. 3rd, 2577-2586.
- Trice R., Warren N., and Anderson O.L. (1974) Rock elastic properties and near-surface structure at Taurus-Littrow. Proc. Lunar Sci. Conf. 5th, 2903-2911.
- Tsay F.D., Norris J.R., and Katz J.J. (1976) Characterization of lunar metallic iron phases by electron spin resonance. Lunar Science VII, 876-878.

- Turner G. (1972) ^{40}Ar - ^{39}Ar age and cosmic ray irradiation history of the Apollo 15 anorthosite 15415. Earth Planet. Sci. Lett. 14, 169-175.
- Turner G., Huneke J.L., Podosek F.A., and Wasserburg, G.J. (1972) Ar^{40} - Ar^{39} systematics in rocks and separated minerals from Apollo 14. Proc. Lunar Sci. Conf. 3rd, 1589-1612.
- Turner G., Cadogan P.H., and Yonge C.J. (1973) Argon selenochronology. Proc. Lunar Sci. Conf. 4th, 1889-1914.
- Uhlmann D.R. and Klein L.C. (1976a) Crystallization kinetics, viscous flow, and thermal histories of lunar breccias 15286 and 15498. Lunar Planet. Sci. VII, 882-884.
- Uhlmann D.R. and Klein L.C. (1976b) Crystallization kinetics, viscous flow, and thermal histories of lunar breccias 15286 and 15498. Proc. Lunar Sci. Conf. 7th, 2529-2541.
- Uhlmann D.R., Klein L., Kritchevsky G., and Hopper R.W. (1974) The formation of lunar glasses. Proc. Lunar Sci. Conf. 5th, 2217-2331.
- Uhlmann D.R., Onorato P.I.K., and Scherer G.W. (1979) A simplified model for glass formation. Proc. Lunar Planet. Sci. Conf. 10th, 375-381.
- Uhlmann D.R., Yinnon H., and Fang C.-Y. (1981) Simplified model evaluation of cooling rates for glass-containing lunar compositions. Proc. Lunar Planet. Sci. Conf. 12th, 281-288.
- Unruh D.M. and Tatsumoto M. (1976) KREEP basalt intrusion age: U-Th-Pb systematics of Imbrium Consortium samples. Lunar Science VII, 885-887.
- Unruh D.M. and Tatsumoto M. (1977) Evolution of mare basalts: The complexity of the U-Th-Pb system. Proc. Lunar Sci. Conf. 8th, 1673-1696.
- Unruh D.M., Stille P., Patchett P.J., and Tatsumoto M. (1984) Lu-Hf and Sm-Nd evolution in lunar mare basalts. Proc. Lunar Planet. Sci. Conf. 14th, JGR 89 Supplement, B459-B477.
- Unruh D.M. and Tatsumoto M. (1984) Lu-Hf evolution of KREEP. Lunar Planet. Sci. XV, 876-877.
- Virgo D. (1973a) Clinopyroxenes from Apollo 15: Fe^{2+} , Mg intracrystalline distributions. Lunar Science IV, 749-751.
- Virgo D. (1973b) Crystallization and subsolidus cooling history of Apollo 15 basalts 15076 and 15476. Carnegie Inst. Wash. Yr. Bk. 72, 650-656.

- Walker D., Longhi J., Lasaga A.C., Stolper E.M., Grove T.L., and Hays J.F. (1977) Slowly cooled microgabbros 15555 and 15056. Proc. Lunar Sci. Conf. 8th, 1521-1547.
- Wang H., Todd T., Richter D., and Simmons G. (1973) Elastic properties of plagioclase aggregates and seismic velocities in the Moon. Proc. Lunar Sci. Conf. 4th, 2663-2671.
- Wanke H., Palme H., Spettel B., and Teschke F. (1972) Multi-element analyses and a comparison of the degree of oxidation of lunar and meteoritic matter. In The Apollo 15 Lunar Samples, 265-267.
- Wanke H., Baddenhausen H., Dreibus G., Jagoutz E., Kruse H., Palme H., Spettel B., and Teshke F. (1973) Multi-element analysis of Apollo 15, 16, and 17 samples, and the bulk composition of the Moon. Proc. Lunar Sci. Conf. 4th, 1461-1481.
- Wanke H., Palme H., Baddenhausen H., Dreibus G., Jagoutz E., Kruse H., Palme C., Spettel B., Teshke F., and Thacker R. (1975) New data on the chemistry of lunar samples: Primary matter in the lunar highlands and the bulk composition of the Moon. Proc. Lunar Sci. Conf. 6th, 1313-1340.
- Wanke H., Palme H., Kruse H., Baddenhausen H., Cendales M., Dreibus G., Hofmeister H., Jagoutz E., Palme C., Spettel B., and Thacker R. (1976) Chemistry of lunar highland rocks: a refined evaluation of the composition of the primary matter. Proc. Lunar Sci. Conf. 7th, 3479-3499.
- Wanke H., Blum K., Dreibus G., Hofmeister H., Kruse H., and Spettel B. (1977a) Primary matter in the lunar highlands: a reevaluation. Lunar Science VIII, 973-975.
- Wanke H., Baddenhausen H., Blum K., Cendales M., Dreibus G., Hofmeister H., Kruse H., Jagoutz E., Palme C., Spettel B., Thacker R., and Vilcsek E. (1977b) On the chemistry of lunar samples and achondrites. Primary matter in the lunar highlands: A re-evaluation. Proc. Lunar Sci. Conf. 8th, 2191-2213.
- Wanke H., Dreibus G., Palme H., Rammensee W., and Weckwerth G. (1983) Geochemical evidence for the formation of the Moon from material of the earth's mantle. Lunar Planet. Sci. XIV, 818-819.
- Wark D.A., Reid A.F., Lovering J.F., and El Goresy A. (1973) Zirconolite (versus Zirkelite) in lunar rocks. Lunar Science IV, 764-766.
- Warner J., Ridley W.I., Reid A.M., and Brown R.W. (1972) Apollo 15 glasses and the distribution of non-mare crustal rock types. In The Apollo 15 Lunar Samples, 179-181.

- Warren N., Trice R., Soga N., and Anderson O.L. (1973) Rock physics properties of some lunar samples. Proc. Lunar Sci. Conf. 4th, 2611-2629.
- Warren P.H. and Wasson J.T. (1978) Compositional-petrographic investigation of pristine nonmare rocks. Proc. Lunar Planet. Sci. Conf. 9th, 185-217.
- Warren P.H. and Wasson J.T. (1979) The compositional-petrographic search for pristine non-mare rocks: Third foray. Proc. Lunar Planet. Sci. Conf. 10th, 583-610.
- Warren P.H. and Wasson J.T. (1980) Further foraging for pristine nonmare rocks: correlations between geochemistry and longitude. Proc. Lunar Planet. Sci. Conf. 11th, 431-470.
- Warren P.H., Afiattalab F., and Wasson J.T. (1978) Investigation of unusual KREEPy samples: Pristine rock 15386, Cone Crater soil fragments 14143, and 12023, a typical Apollo 12 soil. Proc. Lunar Planet. Sci. Conf. 9th, 653-660.
- Warren P.H., Taylor G.J., Keil K., Marshall C., and Wasson J.T. (1981) Foraging westward for pristine nonmare rocks: Complications for petrogenetic models. Proc. Lunar Planet. Sci. Conf. 12th, 21-40.
- Wasserburg G.J. and Papanastassiou D.A. (1971) Age of an Apollo 15 mare basalt; lunar crust and mantle evolution. Earth Planet. Sci. Lett. 13, 97-104.
- Weeks R.A. (1972) Ferromagnetic and paramagnetic resonance of magnetic phases and Fe³⁺ in Apollo 15 samples: a comparison. In The Apollo 15 Lunar Samples, 182-186.
- Weiblen P.W. (1977) Examination of the liquid line of descent of mare basalts in light of data from melt inclusions in olivine. Proc. Lunar Sci. Conf. 8th, 1751-1765.
- Weiblen P. and Roedder E. (1973) Petrology of melt inclusions in Apollo samples 15598 and 62295, and of clasts in 67915 and several lunar soils. Proc. Lunar Sci. Conf. 4th, 681-703.
- Weigand P.W. (1972) Petrology of pyroxene vitrophyre 15597. In The Apollo 15 Lunar Samples, 187-188.
- Weigand P.W. and Hollister L.S. (1973) Basaltic vitrophyre 15597: an undifferentiated melt sample. Earth Planet. Sci. Lett. 19, 61-74.
- Wenk H.-R. and Wilde W.R. (1973) Chemical anomalies of lunar plagioclase, described by substitution vectors and their relation to optical and structural properties. Contr. Min. Pet. 41, 89-104.

- Wenk E., Glauser A., and Schwander H. (1972) On Bytownite 15086,36. In The Apollo 15 Lunar Samples, 189-190.
- Wenk H.-R., Muller W.F., and Thomas G. (1973) Antiphase domains in lunar plagioclase. Proc. Lunar Sci. Conf. 4th, 909-923.
- Wentworth S.J. and McKay D.S. (1984) Density and porosity calculations for Apollo 15 and 16 regolith breccias. Lunar Planet. Sci. XV, 906-907.
- Wiesmann H. and Hubbard N.J. (1975) A compilation of the lunar sample data generated by the Gast, Nyquist and Hubbard PI-ships. NASA Lyndon B. Johnson Space Center, unnumbered publication.
- Willis J.P., Erlank A.J., Gurney J.J., and Ahrens L.H. (1972) Geochemical features of Apollo 15 materials. In The Apollo 15 Lunar Samples, 268-271.
- Wilshire H.G. and Moore H.J. (1974) Glass-coated lunar rock fragments. J. Geol. 82, 403-417.
- Wilshire H.G. Schaber G.G., Silver L.T., Phinney W.C., and Jackson E.D. (1972) Geologic setting and petrology of Apollo 15 anorthosite (15415). Geol. Soc. Am. Bull. 83, 1083-1092.
- Winzer S.R. (1977) Petrographic and petrologic studies of lunar rocks. Martin Marietta Laboratories Tech. Rept. 78-110, 49 pp.
- Winzer S.R. (1978) Petrographic and petrological studies of lunar rocks. Martin Marietta Laboratories Tech. Rept. 78-57c, 40 pp.
- Winzer S.R., Breen K., Ritter A., Meyerhoff M., and Schuhmann P.J. (1978) A Study of glass coatings from some Apollo 15 breccias. Lunar Planet. Sci. IX, 1259-1261.
- Wolf R. and Anders E. (1980) Moon and Earth: compositional differences inferred from siderophiles, volatiles, and alkalis in basalts. Geochim. Cosmochim. Acta 44, 2111-2124.
- Wolf R., Woodrow A., and Anders E. (1979) Lunar basalts and pristine highlands rocks: comparison of siderophile and volatile elements. Proc. Lunar Planet. Sci. Conf. 10th, 2107-2130.
- Wood J.A. and Ryder G. (1977) The Apollo 15 green clods and the green glass enigma. Lunar Science VIII, 1026-1028.
- Wosinski J.F., Williams J.P., Korda E.J., and Geiger G.A. (1973) Glass and devitrified zones on lunar breccia rock 15286,3. Proc. Lunar Sci. Conf. 4th, 383-388.

- Wszolek P.C., Jackson R.F., and Burlingame A.L. (1972) Carbon chemistry of the Apollo 15 deep drill stem and a glass-rich sample related to the uniformity of the regolith and lunar surface processes. In The Apollo 15 Lunar Samples, 324-328.
- Yajima T. and Hafner S.S. (1974) Cation distribution and equilibrium temperature of pigeonite from basalt 15065. Proc. Lunar Sci. Conf. 5th, 769-784.
- Yinnon H., Roshko A., and Uhlmann D.R. (1980) On the barrier to crystal nucleation in lunar glasses. Proc. Lunar Planet. Sci. Conf. 11th, 197-211.
- Yokoyama Y., Sato J., Reyss J.L., and Guichard F. (1973) Variation of solar cosmic-ray flux deduced from ^{22}Na - ^{26}Al data in lunar samples. Proc. Lunar Sci. Conf. 4th, 2209-2227.
- Yokoyama Y., Reyss J.L., and Guichard F. (1974) ^{22}Na - ^{26}Al chronology of lunar surface processes. Proc. Lunar Sci. Conf. 5th, 2231-2247.
- York D., Kenyon W.J., and Doyle R.J. (1972) ^{40}Ar - ^{39}Ar ages of Apollo 14 and 15 samples. Proc. Lunar Sci. Conf. 3rd, 1613- 1622.
- Zook H.A., Hartung J.B., and Storzer D. (1976) Solar flare activity record as derived from lunar microcrater data. Lunar Science VII, 968-970.