

Roberta Oberti



Born in Milan in 1952, Roberta Oberti took her degree in chemistry (cum laude) in 1976 at the University of Pavia. After having taken advantage of a number of grants and temporary positions, she served as researcher in mineralogy at the University of Pavia (1981-1984), CNR researcher (1984-1995) and senior researcher (1995-2001) at the CNR-Centro di studio per la cristallografia e la cristallografia, and as director of research (2002-2018) at CNR-Istituto di Geoscienze e Georisorse (IGG). Since June 2018 she is senior associate at IGG-Pv.

Acknowledgments and awards:

- Ugo Panichi award for young researchers, Società Italiana di Mineralogia e Petrologia, SIMP (1986)
- Hawley Medal, Mineralogical Association of Canada, MAC (1994)
- Fellow, Mineralogical Society of America, MSA (1996)
- Three new species of the amphibole supergroup are named after her: obertiite (1998), ferro-obertiite (2009) and ferri-obertiite (2015)
- Plinius medal for excellence in mineralogy, SIMP (2007)
- Corresponding member of the Accademia delle Scienze di Torino (2012)
- Mario Mammi gold medal, Associazione Italiana di Cristallografia (2013)
- Antonio Feltrinelli award for Geosciences, Accademia Nazionale dei Lincei, ANL (2016)
- Member, Accademia delle Scienze di Torino (2018)
- Corresponding member, Accademia Nazionale dei Lincei (2019)

Society memberships and duties:

- Associazione Italiana di Cristallografia, AIC: president (2006-2008), past president (2009-2011), vice-president (2003-2005), chair of the teaching commission (1997-1999), councilor (1994-1996), councilor and treasurer (1985-1990), member (since 1978)
- Società Italiana di Mineralogia e Petrologia, SIMP: member (since 1980)
- Gruppo Nazionale di Mineralogia, GNM: secretary (2000-2003), councilor (1998-2000), member (since its foundation in 1991)
- Mineralogical Society of America, MSA: member of the mineralogy/petrology research grant committee (2011-2013), member of the committee on committees (2009), member of the nominating committee for fellows (2005-2007), member of the evaluation committee for the best paper award in the American Mineralogist (1998-2002), fellow (since 1996), member (since 1991)
- European Crystallographic Association, ECA: Italian representative in the council (2009-2011)
- European Mineralogical Union, EMU: president (2008-2012), past president and commissioning editor of the EMU Notes in Mineralogy (2012-2020)
- International Mineralogical Association, IMA: Italian representative (since 2011), member of the commission for the IMA medal for excellence in mineralogy (2008-2010)

- International Union of Crystallography, IUCr: member of the commission on inorganic and mineral structures (since 2011)

Other present or recent commitments:

- Chair of the CNR commission for the relations between CNR and IUCr (2008-2018)
- Co-chair of the IMA subcommittee on amphibole nomenclature (since 2006)
- President of the Italian-Spanish commission for the 2010 MISCA Gold Medal
- Member of the advisory board, Elements (2009-2012)
- Guest editor of a special issue (78-5) in the Mineralogical Magazine, focused on session GEOLIFE@Goldschmidt2013
- Guest editor of a special issue focused on amphiboles in the European Journal of Mineralogy (2008)
- Co-editor of volume 67 of the Reviews in Mineralogy and Geochemistry: *Amphiboles: Crystal Chemistry, Occurrence and Health Issues* (2007)
- Co-editor of volume 20 "The contribution of Mineralogy to Cultural Heritage" in the series EMU Notes in Mineralogy (2019)
- Associate editor, American Mineralogist (1998-2001)

Research grants/projects:

- Deutsche Forschungsgemeinschaft. Project MI 1127/7-2 to Borianna Mihailova (Hamburg): Composition, temperature, and pressure dependence of phonon modes in complex hydrous silicates, participant
- PRIN 20158A9CBM "Geochemical and isotopic budget of highly metasomatised sub-continental mantle in the Africa and Europe geodynamic systems: modern and fossil analogues", participant
- PRIN 2009NHLC57, head of the CNR-IGG research unit: Structure, microstructures and cation ordering: a window on to geological processes and geomaterial properties
- PRIN 2007MBBAM9 Compositional and structural complexity in minerals: modulation, phase-transition, structural disorder, participant
- PRIN 2005049503 From mineral to materials: crystal-chemistry, microstructures, modularity, modulations, participant
- PRIN 2002 Geo-crystal-chemistry of trace elements, participant
- 1996-99 Experimental, microchemical and crystal structure investigations of trace element partitioning between amphiboles and mafic silicate melts; German-Italian project funded by the Deutsche Forschungsgemeinschaft to Steve Foley (Gottingen), Italian partner.

Roberta Oberti has coordinated the CNR-DTA working group "Minerals and materials: from Nature to mankind (technology, environment, human health" (2005-2011) and the IGG working groups "Integrating methodologies for a deeper knowledge of geological materials and processes, and of their impact on mankind and environment" (2011-2014) and "Geomaterials" (2015-2016).

While serving in scientific societies (see above) she has planned and/or organized a number of scientific meetings and summer school of relevance to Crystallography and Mineralogy, and contributed to plan 12 volumes of the EMU Notes in Mineralogy.

During her carrier, she has contributed to organize a number of sessions in national and international scientific meetings, which always aimed at providing a chance to compare and integrate different methodologies and different expertise to solve research issues crossing boundaries among allied disciplines.

Roberta Oberti has co-authored around 200 papers in JCR journals, 7 chapters in books, and around 200 oral or poster contributions to scientific meetings. Her H-index (WoS ISI-Thomson) is 36.

Scientific interests and results

Roberta Oberti enjoyed to go a strongly interdisciplinary way, which started from small-molecule crystallography and the pioneer steps of protein crystallography (in 1977 she contributed to the first solution of a protein crystal-structure done in Italy, the myoglobin from *Aplysia Limacina*) and ended to mineralogical crystallography and crystal-chemistry. During her researches, she always paid a great attention to the development of new approaches and methodologies and to how crystal-chemical results can provide innovative and relevant information to allied disciplines.

The main efforts have been devoted to the following topics:

- Crystal-chemistry and systematics of various chemically and structurally complex mineral groups: amphiboles, clinopyroxenes, garnets, staurolites, titanites, hellandites, arrojadites. The goal is to decipher the influence of cation and anion partitioning and ordering patterns on structure geometry and to model their mutual relations as well as those with bulk composition and P , T conditions of formation.
- Improvement of SREF procedures to determine accurate site populations, and pioneering integration of SREF with other analytical (EMP, SIMS, LAM-ICP-MS) and spectroscopic techniques (mainly FTIR and XAFS) to obtain reliable long-range and short-range information. The final goal is to improve crystal-chemical models and provide sounder and more quantitative basis for computational studies of solid solutions.
- Detection, quantification and crystal-chemistry of light, volatile and trace elements in minerals, with major improvements on the correct calculation and use of their partition coefficients. SREF proved to be fundamental to calibrate SIMS analyses for volatile and light elements, and SREF-based equations are now available to quantify OH and Li in amphiboles without doing SIMS analyses. Also, interpretation of partition coefficients in the light of SREF results provided innovative results for amphiboles, pyroxenes, titanites and olivines.
- New procedures for classification and nomenclature of complex mineral groups (hellandites, arrojadites, amphiboles) which are tightly bonded to crystal-chemical features. The one developed for amphiboles and approved by IMA in 2012 is totally based on crystal-chemical results, mostly obtained in Pavia, and on the concept of dominance (introduced for arrojadites, and now used a standard for classification purposes).
- Comparative crystallographic studies of the complex behaviour of amphiboles under high- T conditions (cation migration, thermal expansivity, phase transitions, deprotonation).
- Crystal-chemical models of deprotonation processes in amphiboles.
- Implications and applications of this knowledge to petrology and geochemistry, and to the use of geomaterials for technological, environmental and health issues

Publications

Reviews and chapters:

- 1) OBERTI R. (2001) The diffraction experiment in the study of solid solutions: long range properties. *EMU Notes in Mineralogy*, vol. 3, 179-205.
- 2) HAWTHORNE F.C., OBERTI R. (2007) Amphiboles: Crystal-chemistry. In: *Amphiboles: Crystal Chemistry, Occurrence and Health Issues* edito da F.C. Hawthorne, R. Oberti, G. Della Ventura e A. Mottana. *Reviews in Mineralogy and Geochemistry*, vol. 67, 1-54. DOI: 10.2138/rmg.2007.67.1.
- 3) HAWTHORNE F.C., OBERTI R. (2007) Classification of the amphiboles. In: *Amphiboles: Crystal Chemistry, Occurrence and Health Issues* edito da F.C. Hawthorne, R. Oberti, G. Della Ventura e A. Mottana. *Reviews in Mineralogy and Geochemistry*, vol. 67, 55-88. DOI: 10.2138/rmg.2007.67.2.
- 4) OBERTI R., DELLA VENTURA G., CÁMARA F. (2007) New amphibole compositions: natural and synthetic. In: *Amphiboles: Crystal Chemistry, Occurrence and Health Issues* edito da F.C. Hawthorne, R. Oberti, G. Della Ventura e A. Mottana. *Reviews in Mineralogy and Geochemistry*, vol. 67, 89-124. DOI: 10.2138/rmg.2007.67.3.
- 5) OBERTI R., HAWTHORNE F.C., CANNILLO E., CÁMARA F. (2007) Long-range order in amphiboles. In: *Amphiboles: Crystal Chemistry, Occurrence and Health Issues* edito da F.C. Hawthorne, R. Oberti, G. Della Ventura e A. Mottana. *Reviews in Mineralogy and Geochemistry*, vol. 67, 125-172. DOI: 10.2138/rmg.2007.67.4.
- 6) TIEPOLO M., VANNUCCI R. FOLEY S., OBERTI R., ZANETTI A. (2007) Trace-Element Partitioning Between Amphiboles and Silicate Melts. In: *Amphiboles: Crystal Chemistry, Occurrence and Human Health* edito da F.C. Hawthorne, R. Oberti, G. Della Ventura e A. Mottana. *Reviews in Mineralogy and Geochemistry*, vol. 67, 417-452. DOI: 10.2138/rmg.2007.67.11.
- 7) ARTIOLI G., OBERTI R. (2019) Chapter 1. Introduction: The role of modern mineralogy in cultural heritage studies. In: *The contribution of mineralogy to cultural heritage* edito da Gilberto Artioli e Roberta Oberti. *EMU Notes in mineralogy*, vol 20, 1-11. DOI:10.1180/EMU-notes.20.1.

Papers in JCR journals (beyond those listed under 2-6 above):

- 1) PIETRA S., BETTINETTI G.F., ALBINI A., FASANI E., OBERTI R. (1978) Photoreaction of 2-nitrophenazine 10-oxide with amines. *Journal of the Chemical Society, Perkin II Trans.*, 185-189.
- 2) UNGARETTI L., BOLOGNESI M., CANNILLO E., OBERTI R., ROSSI G. (1978) The crystal structure of met-myoglobin from *Aplysia limacina* at 5 Å resolution. *Acta Crystallographica*, B34, 3658-3662.
- 3) OBERTI R., CODA A., INCOCCIA L., COMIN F. (1978) [1] benzo [4,5] oxepino [2,3-b] quinoxaline and [3] benzoxepino [1,2-b] quinoxaline: two previously unknown photoproducts from benzo [a] phenazine-7-oxide. *Acta Crystallographica*, B34, 1544-1548.
- 4) OBERTI R., GANDOLFI R. (1978) 9,10 dichloro-8(2,4 dinitro phenyl)-5,8a,9,10,10a,10b hexahydro (8α, 9α, 10α, 10α, 10bβ)-6H-cyclobuta [4,5] pyrazolo [3,2-a] isoquinoline, C₁₉H₁₆Cl₂N₄O₄. *Crystal Structure Communications*, 7, 15-20.
- 5) OBERTI R., GANDOLFI R. (1978) 9,10 carbonyl dioxy-8-phenyl-5, 8a, 9, 10, 10a, 10b hexahydro (8α, 9α, 10α, 10α)-6H-cyclobuta [4,5] pyrazolo [3,2-a] isoquinoline, C₂₀H₁₈N₂O₃. *Crystal Structure Communications*, 7, 21-26.
- 6) DESIMONI G., RIGHETTI P., TACCONI G., OBERTI R. (1979) Heterodiene syntheses. Part 20: 4-arylidene-5-pyrazolones and ynamines: a (2+2) cycloaddition followed by electrocyclic ring opening, in competition with a (4+2) cycloaddition. The influence of the substituents on the intermediate. *Journal of the Chemical Society, Perkin I*, 856-861.
- 7) RIGHETTI P., TACCONI G., CODA CORSICO PICCOLI A., PESENTI M.T., DESIMONI G., OBERTI R. (1979) Heterodiene syntheses-XXI: 1-acetyl-2-oxoindolin-3-ylidenaceto phenones

and etoxyethyne: spirobicyclic intermediates in competition with (2+2) and (4+2) cycloadditions. *Journal of the Chemical Society, Perkin I* (1979), 863-868.

- 8) BERNI R., MOZZARELLI A., ROSSI G.L., BOLOGNESI M., OBERTI R. (1979) Crystallographic symmetry and coenzyme binding properties of D-glyceraldehyde 3-phosphate dehydrogenase from the tail muscle of *Palinurus Vulgaris*. *Journal of Biological Chemistry*, 254, n. 16, 8004-8006.
- 9) BOLOGNESI M., LIBERATORI J., OBERTI R., UNGARETTI L. (1979) Preliminary crystallographic data on Buffalo β -lactoglobulin. *Journal of Molecular Biology*, 131, 411-413.
- 10) OBERTI R., DOMENEGHETTI M.C., GANDOLFI R. (1979) 4-(4-chlorophenyl)-4,4a-dihydro-1,3-diphenyl-1H-cyclohepta [e]-1,2,4-triazine. *Crystal Structure Communications*, 8, 341-346.
- 11) TACCONI G., LEONI M., RIGHETTI P., DESIMONI G., OBERTI R., COMIN F. (1979) Heterodiene syntheses-XXIII: Zwitterions as intermediates in the formation of Michael adducts or as stable products of the reactions between 2-oxindolin-3-ylidene derivatives with enamines or amins. *Journal of the Chemical Society, Perkin I*, 2687-2695.
- 12) DE MICHELI C., GANDOLFI R., OBERTI R. (1980) Syn-anti selectivity in cycloadditions. 6. Cycloadditions of benzonitrile oxide, 2-diazopropane and diphenylnitril-imines to polychloro-norbornadienes. *Journal of Organic Chemistry*, 45, 1209-1213.
- 13) TACCONI G., DACREMA MAGGI L., ALBINI MARINONE F., RIGHETTI P., OBERTI R. (1980) Oxindole rearrangements, part 1. Conversion of β -benzoyl- β -oxindolylpropion-aldehydes into 3-aryl-3a,4,5,6a-tetrahydro-furo[2,3-b]furan-2-(3H)-ones. *Journal of Chemical Research (S)*: 22-23, (M): 201-216.
- 14) MARINONE ALBINI F., VITALI D., OBERTI R., CARAMELLA P. (1980) Activation of the syn face of an isoxazoline by a carbamate group. *Journal of Chemical Research (S)*: 348, (M): 4355-4384.
- 15) ALBINI A., BETTINETTI G.F., MINOLI G., OBERTI R. (1980) Heterapentalenes. The reaction of 5H-pyrazolo 1',2',2,3-1,2,3 triazolo [4,5-a] phenazin-4-ylum-5-ide and some of its derivatives with dimethyl acetylendi-carboxylate. *Journal of Chemical Research (S)*: 404-405, (M): 4801-4809.
- 16) BOLOGNESI M., NUNZI A., OBERTI R., POLIDORI P. (1981) An application of the theory of representations: the structure of 2-isopropoxy-5-isopropyl-3,7,8,10 tetramethyl-5,10, dihydrobenzo-g-pteridin-4(3H)-one. *Acta Crystallographica*, B37, 2190-2193.
- 17) CANNILLO E., OBERTI R., UNGARETTI L. (1981) "CORANF", un programma per il calcolo e la elaborazione di parametri chimici e geometrici degli anfiboli. *Rendiconti SIMP*, 37, 613-621.
- 18) ALBINI A., FASANI E., OBERTI R. (1981) Photochemical benzylation of 1,4-dicyanonaphtalene; X-ray crystal structure of 6,11-diciano-5,11-methano-5,6,11,12-tetrahydrodibenzo [a,e] cyclo-octene. *Journal of the Chemical Society, Chemical Communications*, 50-51.
- 19) ALBINI A., FASANI E., OBERTI R. (1982) The photochemical reaction between 1,4-dicyanonaphtalene and 8-methylbenzenes: electron transfer and formation of benzylic radicals. *Tetrahedron*, 38-8, 1027-1034.
- 20) CANNILLO E., OBERTI R., UNGARETTI L. (1983) Phase extension and refinement by density modification in protein crystallography. *Acta Crystallographica*, A39, 68-74.
- 21) MARINONE ALBINI F., OBERTI R., CARAMELLA P. (1983) The oximation of some 3-acyl indoles. A convenient entry to 3-acylaminoindoles. *Journal of Chemical Research (S)*:4-5, (M): 147-171.
- 22) OBERTI R., BERNABEI M.T., FORNI F., CAMERONI R., GALLI E. (1983) The structure of 7-chloro-4-ethyl-2,3,3a,4-tetrahydro-1H-pyrrolo [2,1-c] 1,2,4 benzothiadiazine-5,5-dioxide, C₁₂H₁₅ClN₂O₂S. *Acta Crystallographica*, C39, 1278-1280.
- 23) OBERTI R., ALBINI A., FASANI E. (1983) The structure of a 1,3-oxazonine derivative obtained by photochemical addition of 6-cyano-phenanthridine N-oxide and 2,3-dimethyl-2-butene. *Journal of Heterocyclic Chemistry*, 20, 1007-1009.
- 24) OBERTI R., MUNNO R., FORESTI E., KRAJEWSKY A. (1983) A crystal-chemical study on six fassaites from the Predazzo-Monzoni Area. *Rendiconti SIMP*, 38, 649-655.

- 25) MELLINI M., OBERTI R., ROSSI G. (1983) Crystal chemistry and microstructures of pyroxenes and amphiboles in the coronas of the Bergen Arcs and of the Sognefiord Region, Western Norway. *Periodico di Mineralogia*, 52, 583-615.
- 26) CANNILLO E., OBERTI R. (1983) Fast determination of the crystal-chemical composition of *Pbca* orthopyroxenes and *P2/n* clinopyroxenes by means of the measurement of the X-ray diffracted intensities of few reflections. *Rendiconti SIMP*, 39, 103-108.
- 27) OBERTI R., BERNABEI M.T., FORNI F., CAMERONI R., GALLI E. (1984) Structure of (3aS)-7-chloro-4-(2-dimethyl-amino ethyl)-8-methyl-2,3,3a,4-tetrahydro-1H-pyrrolo [2,1-c] 1,2,4 benzothiadiazine-5,5-dioxide, C₁₅H₂₂ClN₃O₂S. *Acta Crystallographica*, C40, 882-884.
- 28) VEZZALINI G., OBERTI R. (1984): The crystal chemistry of gismondines: the non-existence of K-rich gismondines. *Bulletin de Minéralogie*, 107, 805-812.
- 29) GRIFFIN W.L., MELLINI M., OBERTI R., ROSSI G. (1985) Evolution of coronas in Norwegian anorthosites: re-evaluation based on crystal-chemistry and microstructures. *Contributions to Mineralogy and Petrology*, 91, 330-339. DOI: **10.1007/BF00374689**.
- 30) CORSICO CODA A., DESIMONI G., PAPPALARDO M., RIGHETTI P.P., SENECCI P.F., TACCONI G., OBERTI R. (1985) Copper(II) in organic synthesis. IV. Reaction of the copper(II) acetate complex of isatin-3-arylhydrazones with dimethylacetylenedicarboxylate. *Tetrahedron*, 41-12, 2545-2555.
- 31) ARGENTINI M., WEINREICH R., OBERTI R., UNGARETTI L. (1986) Synthesis and crystal structure of 3-deoxy-3-fluoro-1,2-5,6-di-O-isopropylidene-D-glucofuranose. *Journal of Fluorine Chemistry*, 32, 239-254. DOI: **10.1016/S0022-1139(00)80510-2**.
- 32) BURDISSO M., GAMBA A., GANDOLFI R., OBERTI R. (1986) Site selectivity in the reaction of tetracyanoethene with tetracyclo [5.3.2.0 2,10.0 3,6] dodeca-4,8,11-triene. A borderline case of homo-Dies-Alder reaction. *Tetrahedron*, 42-3, 923-936. DOI: **10.1016/S0040-4020(01)87499-8**.
- 33) ROSSI G., OBERTI R., SMITH D.C. (1986) The crystal structure of Lisetite, CaNa₂Al₄Si₄O₁₆. *American Mineralogist*, 71, 1378-1383.
- 34) ROSSI G., OBERTI R., DAL NEGRO A., MOLIN G.M., MELLINI M. (1987) Residual electron density at the M2 site in *C2/c* clinopyroxenes: relationships with bulk chemistry and sub-solidus evolution. *Physics and Chemistry of Minerals*, 14, 514-520. DOI: **10.1007/BF00308286**.
- 35) UNGARETTI L., OBERTI R., CANNILLO E. (1987) Crystal-chemical studies at differing P, T, X conditions: principles and perspectives in Earth Sciences. *Atti Ticinensi di Scienze della Terra*, 31, 142-155.
- 36) BURDISSO M., GAMBA A., GANDOLFI R., OBERTI R. (1988): Steric effects vs. secondary orbital interactions in nitrene cycloadditions. Steric effects in cycloreversion of isoxazolidines. *Tetrahedron*, 44-12, 3735-3748. DOI: 10.1016/S0040-4020(01)86003-8.
- 37) KRSTANOVIC I., CVETOVIC N., OBERTI R., KARANOVIC L.J. (1989) Structure of 17 α -hydroxyprogesterone caproate, C₂₇O₄H₄₀. *Acta Crystallographica*, C45, 478-480.
- 38) ROSSI G., OBERTI R., SMITH D.C. (1989) The crystal structure of a K-poor Ca-rich silicate with the nepheline framework, and crystal-chemical relationships in the compositional space (K-Na-Ca-□)₈Al₈Si₈O₃₂. *European Journal of Mineralogy*, 1, 59-70.
- 39) OBERTI R., CAPORUSCIO F.A. (1991) Crystal-chemistry of clinopyroxenes from mantle eclogites: a study of the key-role of the M2 site population by means of crystal-structure refinement. *American Mineralogist*, 76, 1141-1152.
- 40) OBERTI R., SMITH D.C., ROSSI G., CAUCIA F. (1991): The crystal-chemistry of high-aluminium titanites. *European Journal of Mineralogy*, 3, 777-792.
- 41) SANTOYO GONZALES F., GIMENEZ MARTINEZ, J.J., ISAC GARCIA J., LOPEZ APARICIO F.J., ROBLES DIAZ, R., RODRIGUEZ GALLEGU M., OBERTI R., UNGARETTI L. (1991) Use of L-methyl cyanoacetate in the synthesis of chiral 3-deoxy-5-thiopentopyranoses branched at C-3. *Journal of Chemical Research*, (S) 14-15, (M) 240-254.
- 42) BURDISSO M., GANDOLFI R., TOMA L., OBERTI R. (1991) Hexafluoroisopropanol as a suitable solvent for rearrangements via zwitterionic intermediates. *Tetrahedron*, 47, 6725-6736. DOI: 10.1016/S0040-4020(01)82324-3.
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- 47) HAWTHORNE F.C., UNGARETTI L., OBERTI R., CAUCIA F., CALLEGARI A. (1993) The crystal-chemistry of staurolites. I: Crystal structure and site populations. *Canadian Mineralogist*, 31, 551-582.
- 48) HAWTHORNE F.C., UNGARETTI L., OBERTI R., CAUCIA F., CALLEGARI A. (1993) The crystal-chemistry of staurolites. II: Order-disorder and the monoclinic \leftrightarrow orthorhombic phase transition. *Canadian Mineralogist*, 31, 583-596.
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- 52) FRANCESCHI G., BEDESCHI A., RIZZO V., VIGEVANI A., OBERTI R. (1993): Structural studies of ritipenem acoxyl (FCE 22891). X-ray crystal structure and chiroptical properties. *Bioorganic and Medicinal Chemistry Letters*, 3-11, 2333-2336. DOI: [10.1016/S0960-894X\(01\)80950-1](https://doi.org/10.1016/S0960-894X(01)80950-1).
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