

CRISTINA CARBONE

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CURRICULUM VITAE (Updated June 25, 2018)

- 2002 - Graduated with honors in Geological Sciences, University of Genoa
- 2003 - 2005 Research fellow in Mineralogy
- 2008 - Ph.D in Earth Sciences University of Genova, Italy.
- 2008 - 2018 Permanent position as Researcher in Mineralogy, University of Genova, Italy.
- 01-07-2018 Associate Professor in Mineralogy, University of Genova, Italy

RESEARCH ACTIVITY

The topics can be grouped into four main areas of research:

- 1) mineralogy of "extreme" environments, in particular Acid Mine Drainage processes;
- 2) mineralogy of karst and hypogene environments;
- 3) systematic mineralogy of new or rare phases;
- 4) mineralogy applied to the materials sciences;
- 5) biosphere mineral interactions.

SCIENTIFIC PRODUCTION

Cristina Carbone produced: a) **39** research ISI papers; b) **46** abstract presented in international conference; c) **49** abstract presented in national conference d) **2** patent.

INTERNATIONAL SCIENTIFIC EXPERIENCES

- 2006 Applications of the Rietveld methodology to the qualitative and quantitative analysis of minerals and the refinement of crystalline structures from powder spectra. (Prof. Tonci Balic-Zunic), University of Copenhagen (Denmark).

- Participation and management of 7 projects presented and financed by the European Synchrotron Radiation Facility (ESRF) of Grenoble:

- 2005 Main proposer of experiment CH-195: *“Characterization by means of micro-diffraction and micro-fluorescence analyses of Fe-oxyhydroxides*

heterogeneous aggregates formed by supergenic alteration of natural Fe-Cu sulfides", from 18/11/2005 to 22/11/2005 at ID18F beamline.

- 2006 Co-proposer of experiment EC-156: "*Characterization by means of μ -XRF and μ -XANES of Fe-oxides and oxyhydroxides formed by polymetallic sulphides alteration during AMD processes*", from 19/04/2007 to 24/04/2007 at ID21 beamline.
- 2009 Main proposer of experiment HS-3555: "*Micrometric single crystal structure analyses of Vanadium minerals with unresolved structure*", from 25/09/2009 to 26/09/2009 at ID13 beamline.
- 2009 Co-proposer of experiment HS-3969: "*Lattice preferred orientation of omphacite in eclogite samples from the Western Alps (Voltri Massif, Italy)*" from 14/12/2009 to 15/12/2009 beamline.
- 2015 Main proposer of experiment ES-248: "*Zn speciation in colloidal precipitates and fungi related to Acid Mine Drainage processes*" from 21/07/2015 to 27/07/2015 at ID13 beamline..
- 2016 Co-proposer of experiment ES-367: "*Y and Ce chemical state and local environment in colloidal precipitates related to acid mine drainage environment*" from 03/03/2016 to 07/03/2016 at BM08 beamline.
- 2016 Main proposer of experiment EV-197 "*Woodwardite structural refinement and effect of Y and Ce incorporation*" from 03/10/2017 to 05/10/2017 at BM01 beamline.

ORGANIZATION OF SCIENTIFIC ACTIVITIES

- Participation of the PhD program in Earth Sciences of the PhD School "Sciences and Technologies for the Environment and Territory" (STAT) in the year 2013; 2014 and 2015.
- Organization of the First Study Day for PhD students Earth Science PhD days held in Pisa (University of Pisa) on 7 and 8 September 2017.
- Organization and participation in the short refresher course for 2nd grade secondary school teachers held in Genoa on 22 September 2017.
- Presence in the scientific committee at the congress of the National Scientific Museology Association (ANMS) "the Museum and its Contacts" which was held in Genoa from 25 to 27 October 2017.
- Chairperson at the session "Contacts with the territory" of the ANMS congress entitled "the Museum and its contacts" which was held in Genoa from 25 to 27 October 2017.

RESEARCH PROJECTS PARTICIPATION

- Participant in national research projects (PRIN 2001, 2003, 2006, 2008, 2010, 2012, 2014); coordinated projects (C.N.R.); LIFE Fibers project (for acquisition and interpretation of XRD data); PRAT project with the University of Padua and Cagliari and University projects of the University of Genova.
- Scientific manager of national project (MIUR) presented in the 2012 call for proposals Law 6/2000 entitled: "Minerabilia: riallestimento della Sala di Mineralogia e Geologia del Museo Civico di Storia Naturale Giacomo Doria".
- Scientific manager of three research projects of local interest (P.R.A, University of Genoa).

PROFESSIONAL AFFILIATIONS

Affiliated to the following national and international scientific institutions: Italian Society of Mineralogy and Petrology (SIMP); National Group of Mineralogy (GNM); European Synchrotron Radiation Facility (ESRF); Italian Group of Electronic Spin (GIRSE); American Geophysical Union (AGU) European Microbeam Analysis Society (EMAS); National Association of Scientific Museology (ANMS).

PEER REVIEW JOURNAL ACTIVITY

- Journal of Geochemical Exploitation
- Environmental Journal
- American Mineralogist
- Chemical Geology
- European Journal Mineralogy
- Applied Clay Mineral
- Water and Soil Pollution
- Environmental Science and Pollution Research
- Science of Total Environments

EDITORIAL ACTIVITY

- Editorial Board of Journal of Waste Management and Environmental Issues.
- Editor of Special Issue "Mineral Crystallinity" of Crystals (impact factor 1.566).
- Included in the reviewer's database REPRIZE-MIUR

INSTITUTIONAL ACITIVITY

- 2013- 2017 member of the Tutoring Commission of the degree course in Geological Sciences

- 2018 Responsible of Tutoring Activity in degree of Geological Science
- Since 2013 Responsible of teaching laboratories from the degree in Geological Sciences.
- From 2016 to today member of the management board of the Italian Society of Mineralogy and Petrology (SIMP).
- Since 2010 Scientific manager of the X-ray diffractometry laboratory (XRD) of DISTAV.

TEACHING ACTIVITY

- Teaching courses in Geological and Natural Sciences and Restoration Methodologies for cultural heritage: Mineralogy, Applied Mineralogy, Gemology, Crystallography and Crystallography, Laboratory of Mineralogy and Petrography.
- Teaching course "Advanced mineralogical techniques" (2CFU) for the PhD course in Earth Sciences of the STAT doctoral school of the University of Genoa.
- Supervisor of thesis and master's theses for the degree course in Geological and Natural Sciences of the University of Genoa.
- Co-tutor of thesis and master's thesis for the degree course in Geological Sciences of the University of Bologna and Environmental Science of Ravenna
- Supervisor of two doctoral theses of the University of Genoa (candidates: Eva Azzali and Sirio Consani) and actually co-author of a doctoral thesis in collaboration with the Department of Geosciences at the University of Padua (Simone Molinari).

NATIONAL AND INTERNATIONAL PATENTS

- Zotti M., Cardinale A., Giovine M., Carbone C., Di Piazza S., Cecchi G. Mariotti M. (2015). MI.P.RE.ME (METODO PER RECUPERARE METALLI PREZIOSI E TERRE RARE DA MATERIALI DI SCARTO). Domanda numero: 102015000041404 deposito 03/08/2015.
- Zotti M., Cardinale A., Giovine M., Carbone C., Di Piazza S., Cecchi G. Mariotti M. (2016). MI.PRE.ME (Methods of recovering precious metals and rare earth elements from waste materials). Patent number: 16182075.8 1370 of 13/11/2016.

PUBLICATIONS (since 2010)

P1) Marescotti P., Azzali E., Servida D., Carbone C., De Capitani L., Greco G. & Lucchetti G. (2010). Mineralogical and geochemical spatial analyses of a

waste-rock dump at the Libiola Fe-Cu sulphide mine (Eastern Liguria, Italy). *Environmental Earth Geology*, vol 61 (issue1) 187-199.

P2) Basso R. & Carbone C. (2010). Relationships between crystallographic and compositional parameters of minerals belonging to the carpholite group. *Periodico di Mineralogia*, 79, 91-98.

P3) Roccotiello E., Zotti M., Mesiti S., Marescotti P., Carbone C., Cornara L. and Mariotti M. G.(2010). Biodiversity in metal-polluted soils. *Fresenius Environmental Bulletin*, 19(10b), 2420-2425.

P4) Carbone C., Marescotti P., Lucchetti G., Cauzid J. & Chalmin E. (2011). Application of synchrotron radiation-based techniques (μ -XRD, μ -XRD, and μ -XANES) to study Fe-rich hardpans within waste-rock dump. *N. Jb. Miner. Abh., NJMA*, special issue188 (1), 21-30.

P5) Azzali E., Carbone C., Marescotti P. & Lucchetti G. (2011). Relationships between soil colour and mineralogical composition: application for the study of waste-rock dumps in abandoned mines. *NJMA special Issue*, 188 (1), 75-85.

P6) Bindi L., Carbone C., Cabella R., Lucchetti G. (2011). Bassoite, SrV₃O₇·4H₂O, a new mineral from Molinello mine, Val Graveglia, eastern Liguria, Italy. *Mineralogical Magazine*, 75(5), 2549–2558.

P7) Marescotti P. Carbone C., Comodi P., Frondini F. Lucchetti G. (2012). Mineralogical and chemical evolution of ochreous precipitates from the Libiola Fe–Cu-sulfide mine (Eastern Liguria, Italy). *Applied Geochemistry*, 27, 577-589.

P8) Carbone C. Marescotti P., Lucchetti G., Martinelli A., Basso R. & Cauzid J. (2012) Migration of selected elements of environmental concern from unaltered pyrite-rich mineralizations to Fe-rich alteration crusts. *Journal of Geochemical Exploration*, 114, 109-117.

P9) Balestra C., Bracco R., Pozzi A., Finello G., Castellaro F., Callegari A.M., Boiocchi M., Mills S.J., Bindi L., Carbone C., Ciriotti M. (2012). Coralloite, Paseroite e Bassoite: tre nuove specie in Liguria. *Rivista Micro* (ISSN: 1724-7438) 10(2), 78-96.

P10) A. R. Kampf, A. C. Roberts, K. E. Venance, C. Carbone, D. Belmonte, G. E. Dunning, E. Walstrom. (2013). Cerchiarait-(Fe) and cerchiarait-(Al), two new barium cyclosilicate chlorides from Italy and California, USA. *Mineralogical Magazine*, 77(1), 69-80.

P11) Marescotti P., Roccotiello E., Zotti M., De Capitani L., Carbone C., Azzali E., Mariotti M.G., Lucchetti G. (2013). Influence of soil mineralogy and chemistry on fungi and plants in a waste-rock dump from the Libiola mine (eastern Liguria, Italy). *Periodico di Mineralogia*, 82, 1, 141-162.

- P12)** Bindi L., Carbone C., Belmonte D., Cabella R., Bracco R. (2013). Weissite from Gambatesa mine, Val Graveglia, Liguria, Italy: occurrence, composition and determination of the crystal structure. *Mineralogical Magazine*, Vol. 77(3), pp. 475–483.
- P13)** Carbone C., Basso R., Cabella R., Martinelli A., Grice J.D., Lucchetti G. (2013) Mcalpineite from the Gambatesa mine, Italy, and redefinition of the species. *American Mineralogist*, 98, 1899-1905.
- P14)** Carbone C., Dinelli E., Marescotti P., Gasparotto G., Lucchetti G. (2013). The role of AMD secondary minerals in controlling environmental pollution: indications from bulk leaching tests. *Journal of Geochemical Exploration*, 132, 188-200.
- P15)** Azzali E., Marescotti P., Frau F., Dinelli E., Carbone C., Capitani G., Lucchetti G. (2014). Mineralogical and chemical variations of ochreous precipitates from Acid Sulphate Waters (ASW) at Rosia Montana Gold Mine (Romania). *Environ. Earth Sci.* vol. 72 p. 1-18. DOI 10.1007/s12665-014-3264-z.
- P16)** Carbone C., Camarda S., Muzio C., Passarino G., Sanguineti G. (2014). La Miniera di Libiola: il giacimento ferroso cuprifero della Val Gromolo, Sestri Levante, Genova. *Rivista Mineralogica Italiana*, vol 3 pag 144-169. ISSN 0391-9641
- P17)** Rellini I., Trombino L., Carbone C., Firpo M. (2014). Petroplinthite formation in a pedosedimentary sequence along a northern Mediterranean coast: from micromorphology to landscape evolution. *J. Soils Sediments*, 15, (6), 1311-1328 (2.107)
- P18)** Cutroneo L., Castellano M., Carbone C., Consani S., Gaino F., Tucci S., Magrì S., Povero P., Bertolotto R.M., Canepa G., Capello M. (2015). Evaluation of the boundary condition influence on PAH concentrations in the water column during the sediment dredging of a port. *Marine Pollution Bulletin*. 101, 583–593. doi 10.1016/j.marpolbul.2015.10.055, PII S0025-326X(15)30129-6.
- P19)** Montefalcone M., Vacchi M., Carbone C., Cabella R., Schiaffino C.M., Elter F.M., Morri C., Nike Bianchi C., Ferrari M. (2016) Biogeomorphology of seagrass: settlement on hard rock allows *Posidonia oceanica* withstanding wave stress in shallow water. *Estuarine, Coastal and Shelf Science* 180 114-122
- P20)** Consani S., Carbone C., Salviulo G., Zorzi F., Dinelli E., Botter R., Nodari L., Badocco D., Lucchetti G. (2016) Effect of temperature on the release and remobilization of ecotoxic elements in AMD colloidal precipitates: the example of the Libiola copper mine, Liguria (Italy). *Environmental Science and Pollution Research*. Vol 23, 12900–12914. First online: 18 March 2016, doi: 10.1007/s11356-016-6406-xP26)

- P21)** Carbone C., Dinelli E., De Waele J (2016). Characterization of minothems at Libiola (NW, Italy): morphological, mineralogical and geochemical study. *International Journal of Speleology*, 45(2) 171-183.
- P22)** Consani S., Carbone C., Dinelli E., Cutroneo L., Capello M., Salviulo G., Lucchetti G. (2017). Metal transport and remobilisation in a basin affected by acid mine drainage: the role of ochreous amorphous precipitates. *Environmental Science and Pollution Research.*, 24, 15735–15747. DOI 10.1007/s11356-017-9209-9
- P23)** Capello M., Cutroneo L., Consani S., Dinelli E., Vagge G., Carbone C. (2016). Marine sediment contamination and dynamics at the mouth of a contaminated torrent: the case of the Gromolo Torrent (Sestri Levante, North-western Italy). *Marine Pollution Bulletin*, 109 pag 128-141. <http://dx.doi.org/10.1016/j.marpolbul.2016.06.010>
- P24)** Di Piazza S., Cecchi G., Cardinale A.M., Carbone C., Mariotti M.G., Giovine M., Zotti M. (2016). Mycometallurgy: filamentous fungi for recovering precious metals and rare-earth elements from waste materials. *Waste Management* 60, 596-600. <http://dx.doi.org/10.1016/j.wasman.2016.07.029>.
- P25)** Belmonte D., Carbone C., Doria G. (2016). La nuova Sala Mineralogica del Museo Civico di Storia Naturale “G. Doria” di Genova. *Prie, Notiziario di Mineralogia*, vol 11 pag 41-54.
- P26)** De Waele J., Carbone C., Sanna L., Vattano M., Galli E. Sauro F., Forti P. (2017). Secondary minerals from salt caves in the Atacama Desert (Chile): a hyperarid and hypersaline environment with potential analogies to the Martian subsurface. *International Journal of Speleology*, 46(19) 51-66.
- P27)** Lagazzo A., Barberis F., Carbone C., Ramis G., Finocchio E. (2017). Molecular level interactions in brushite-aminoacids composites (2017). *Materials Science and Engineering C. mater Biol App.* Jan 1;70(Pt 1):721-727. doi: 10.1016/j.msec.2016.09.030.
- P28)** Cutroneo L., Carbone C., Consani S., Vagge G., Canepa G., Capello M. (2017). Environmental complexity of a port: Evidence from circulation of water masses, and composition and contamination of bottom sediments. *Marine Pollution Bulletin* 119 (2017) 184–194.
- P29)** Capello M., Carbone C., Cecchi G., Consani S., Cutroneo L., Di Piazza S., Greco G., Tolotti R., Vagge G., Zotti M. (2017). A mycological baseline study based on a multidisciplinary approach in a coastal area affected by contaminated torrent input. *Baseline Marine Pollution Bulletin* 119 (2017) 446–453.

- P30)** Cama G., Nkhwa S., Gharibi B., Lagazzo A., Cabella R., Carbone C., Dubruel P., Haugen H., Di Silvio L. Deb. S. (2017). The role of new zinc incorporated monetite cements on osteogenic differentiation of human mesenchymal stem cells. *Materials Science & Engineering C* 78, 485–494.
- P31)** Kampf A.R, Carbone C., Belmonte D., Nash B.P., Chiappino L. Castellaro F. (2017). Alpeite, $\text{Ca}_4\text{Mn}_3+2\text{Al}_2(\text{Mn}_3+\text{Mg})(\text{SiO}_4)_2(\text{Si}_3\text{O}_{10})(\text{V}_5+\text{O}_4)(\text{OH})_6$, 2 a new ardennite-group mineral from Italy. *European Journal of Mineralogy* 29(5):907-914. DOI: 10.1127/ejm/2017/0029-2636P35.
- P32)** Kolitsch U., Merlino S., Belmonte D., Carbone C., Cabella R., Lucchetti G., Ciriotti M. E. (2017) Lavinskyite-1M, $\text{K}(\text{LiCu})\text{Cu}_6(\text{Si}_4\text{O}_{11})_2(\text{OH})_4$, the monoclinic MDO equivalent of lavinskyite-2O (formerly lavinskyite), from the Cerchiara manganese mine, Liguria, Italy. *European Journal of Mineralogy* 30(3). DOI: 10.1127/ejm/2018/0030-2731.
- P33)** Balbi T., Camissassi G., Montagna M., Fabbri R., Franzellitti S., Carbone C., Dawson K., Canesi L., (2017). Impact of cationic polystyrene nanoparticles (PS-NH₂) on early embryo development of *Mytilus galloprovincialis*: Effects on shell Formation. *Chemosphere*, 186, 1-9.
- P34)** Consani S., Balić-Žunić T., Cardinale A.M., Sgroi W., Giuli G. Carbone C. (2018). Novel Synthesis Routine for Woodwardite and Its Affinity towards Light (La, Ce, Nd) and Heavy (Gd and Y) Rare Earth Elements. *Materials* 2018, 11, 130; doi:10.3390/ma11010130
- P35)** Tolotti R., Consani S., Carbone C., Vagge G., Capello M., Cutroneo L. (2018). Benthic diatom community response to metal contamination from an abandoned Cu mine: Case study of the Gromolo Torrent (Italy), *J. Environ. Sci.* <https://doi.org/10.1016/j.jes.2018.03.034>.
- P36)** D'Angeli I.M., Carbone C., Nagostinis M., Parise M., Vattano M., Madonia G. and De Waele J., (2018). New insights on secondary minerals from Italian sulfuric acid caves. *International Journal of Speleology*, 47 (3), xx-xx. Tampa, FL (USA) ISSN 0392-6672 <https://doi.org/10.5038/1827-806X.47.3.2175>.