

CURRICULUM VITAE ET STUDIORUM FOR PROF. MATTEO ALVARO

FULL PROFESSOR OF MINERALOGY AND CRYSTALLOGRAPHY
RECTOR'S DELEGATE FOR INTERNATIONAL AFFAIRS IN EUROPE
VICE PRESIDENT OF GLOBEC - "CENTER FOR GLOBAL STRATEGIC ENGAGEMENT"
UNIVERSITY OF PAVIA
(Last update March 2024)



● PERSONAL DETAILS AND CONTACT INFORMATION

Date of birth: December 3rd 1982 (40 years old)

City of birth: Milan (Italy)

Nationality: Italian

E-mail: matteo.alvaro@unipv.it

Work address: Dept. Of Earth and Environmental Sciences, Via A. Ferrata,1 Pavia 27100, Italy

Current Position: Full Professor of Mineralogy and crystallography| Rector's delegate for international affairs in Europe | Vice President of GLOBEC - "Center for Global Strategic Engagement"

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ORCID: [0000-0002-6975-3241](https://orcid.org/0000-0002-6975-3241)

Scopus ID: 24173188200

ResearcherID: B-8451-2013, L-1870-2019

Google Scholar: <https://scholar.google.it/citations?hl=en&user=N16v4gAAAAJ>

● HIGHLIGHTS

- 2015 – 2018 **Awarded the SIR-MIUR grant**, one of the most prestigious research fellowship awarded in Italy to young investigators younger than 40 years old.
- 2015 – **Founded the "Fiorenzo Mazzi" Experimental Mineralogy Laboratory** located at the Dept. of Earth and Environmental Sciences of the University of Pavia, Italy.
- 2016 **Awarded the "Ugo Panichi" prize** from the Italian society of Mineralogy and Petrology for significant scientific contributions in the field of mineralogy.
- 2017 – 2022 **Awarded the European Research Council (ERC) Starting grant**, considered one of the most prestigious grant fellowship awarded to scientist showing high potential with PhD obtained not later than 12 years before the application.
- 2018 **Awarded the "Mario Nardelli" Prize** for researchers who contributed significantly to the development of the Italian crystallography.
- 2019 – Nominated Rector's delegate for international affairs in Europe
- 2019 – Elected as council Member of the Società Italiana di Mineralogia e Petrologia (SIMP)
- 2020 – Nominated vice President of GLOBEC - "Center for Global Strategic Engagement"
- 2021 – **Full Professor of Mineralogy** at Department of Earth and Environmental Sciences of the University of Pavia (38 years old)
- 2021 – **Awarded the EMU Research Excellence Medal** by the European Mineralogical Union as an early career scientist who has made significant contributions to research in mineralogy and whose professional and societal activities contribute to strengthening scientific links in Europe
- 2024 **Awarded Visiting professorship** at the Laboratoire de Géologie de l'École Normale Supérieure, Université Paris Science et Lettres.
- 2024 **Nominated Fellow of the Mineralogical Society of America**

• **EDUCATION**

- 2001 – 2004 Bachelor degree – Geology, (110/110 with honors): “Study of chondritic meteorite Trezzano”. Department of Earth Sciences, University of Pavia, Italy. Advisor: M.C. Domeneghetti
- 2004 – 2006 Masters degree in Geology (110/110 with honors): “Investigation on the Fe²⁺- Mg exchange reaction kinetics for PCA 82506 ureilitic meteorite. Department of Earth Sciences, University of Pavia, Italy. Advisor: M.C. Domeneghetti
- 2006 – 2009 Ph. D. Research: “The P_{21/c} – C_{2/c} phase transition of pigeonite”. Department of Earth Sciences, University of Pavia, Italy. Advisor: M.C. Domeneghetti

• **ACADEMIC POSITIONS (current in bold)**

- Jan 2010 – Dec 2011 Postdoctoral fellow, “Framework minerals at non-ambient conditions” at Virginia Tech Polytechnic Institute and State University, USA. Funded by NSF - EAR 0738692. Advisors: Ross J. Angel and N. Ross
- Apr 2012 – Apr 2013 Postdoctoral fellow, “Comparison between Martian meteorites and their terrestrial analogues for MARS-XRD experiment” at University G. D’Annunzio Chieti-Pescara, Italy. Funded by Italian Space Agency grant (n. I/060/10/0) for the MARS-XRD/ExoMars project. Advisor: L. Marinangeli
- Apr 2013 – Jan 2015 Postdoctoral fellow, “Thermoelastic behavior of mineral inclusions in diamonds” at University of Padua, Italy. Funded by ERC – INDIMEDEA (#307322). Advisor: F. Nestola.
- Feb 2015 – Feb 2016 Postdoctoral fellow, “Elastic geobarometry for UHP metamorphic rocks” at University of Pavia, Italy. Funded by “Research Excellence Fellowship” from University of Pavia.
- Feb 2016 – Oct 2018 Research Scientist, “Elastic geobarometry for UHP metamorphic rocks” at University of Pavia, Italy. Funded by SIR-MIUR MILE DEEp, RBSI140351.
- Jun 2017 – Oct 2018 Research Scientist, “Subduction for UHP metamorphic rocks” at University of Pavia, Italy. Funded by ERC-StG True Depths, n.714936.
- Jan 2018 – Oct 2018 Research Scientist, “Impact cratering processes” at University of Pavia, Italy. Funded by FARE-MIUR IMPACT, n. R164WEJAHH.
- Nov 2018 – Mar 2021 Associate Professor at Department of Earth and Environmental Sciences of the University of Pavia
- Apr 2021 – Full Professor at Department of Earth and Environmental Sciences of the University of Pavia**
- Sept 2023 – Jun 2024 Visiting professor the Laboratoire de Géologie de l’Ecole Normale Supérieure, Université Paris Science et Lettres.**

• **PRIZES, AWARDS and QUALIFICATIONS**

- 2015 IUCr prize for the best scientific communication at the European Crystallography meeting, Croatia.
- 2016 **“Ugo Panichi” prize** from the Italian society of Mineralogy and Petrology for significant scientific contributions in the field of mineralogy.
- 2017 Italian Scientific Habilitation (ASN) as associate Professor (“Professore Associato”) in Mineralogy (SSD GEO/06).
- 2018 **“Mario Nardelli” Prize** for researchers who contributed significantly to the development of the Italian crystallography.
- 2018 Italian Scientific Habilitation (ASN) as full Professor (“Professore Ordinario”) in Mineralogy (SSD GEO/06).
- 2021 **EMU research excellence medal** that is awarded by the European Mineralogical Union to an early career scientist who has made significant contributions to research in mineralogy and whose professional and societal activities contribute to strengthening scientific links in Europe
- 2024 Nominated **fellow of the Mineralogical Society of America**

• **INSTITUTIONAL RESPONSIBILITIES (in bold role in governing bodies)**

- 2015 – Founder and director of the “Fiorenzo Mazzi” Experimental Mineralogy Laboratory, Dept. of Earth and

- Environmental Sciences, University of Pavia, Italy
- 2016 – Faculty member, Dept. of Earth and Environmental Sciences, University of Pavia, Italy
- 2017 – 2018 Member of the Research Committee, Dept. of Earth and Environmental Sciences, University of Pavia, Italy
- 2017 – Member of the Graduate Student Advisory board (PhD Committee), Dept. of Earth and Environmental Sciences, University of Pavia, Italy
- 2017 – Scientific advisor and panel member for the pre-evaluation of Horizon 2020 proposals (INROAD) at University of Pavia, Italy
- 2018 – 2018 Panel member for “valutazione commissari ASN” for the evaluation of the applicants to the committee for the national scientific habilitation (ASN) of the University of Pavia, Italy
- 2018 – 2021 Committee member for the “commissione scatti” to evaluate request for career advancement of professors and researchers at University of Pavia, Italy
- 2019 – Committee member for summer and winter school at University of Pavia, Italy
- 2019 – Rector’s delegate for international affairs in Europe**
- 2020 – Vice President of GLOBEC - “Center for Global Strategic Engagement”**
- 2020 – Member of the working group “Ranking internazionali: analisi, obiettivi e azioni”
- 2021 – Scientific committee for “efficienza e servizi energetici” in the partnership between the University of Pavia and Edison S.p.a.
- 2021 – Committee member for Pavia-Boston initiative at University of Pavia, Italy
- 2023 – Scientific Committee member for accordo quadro INGV-Università di Pavia.

• **TEACHING ACTIVITIES (in bold academic commitment as tenure)**

- 2006 – 2013 Teaching support – Mineralogy and Laboratory (B.Sc, 12 CFU) Geological Sciences, University of Pavia.
- 2015 – 2016 Course taught – Elasticity of crystalline solids (PhD programme in Geology, 3CFU), University of Pavia, Italy.
- 2015 – 2016 Course taught – Analytical methodologies (M.Sc., 3 CFU), University of Pavia, Italy
- 2016 – Course taught – Analytical methodologies applied to geosciences (M.Sc. degree, 6CFU), University of Pavia, Italy (students weighted average evaluation on the 3 courses 8.9/10)**
- 2017 – 2018 Course taught – Computational mechanics for scientific problems (PhD programme of the “Scuola di Alta Formazione Dottorale” SAFD, 6CFU), University of Pavia, Italy
- 2019 – 2019 Course taught – Pomeriggi all’università “Diamanti il viaggio del carbonio all’interno della Terra” (Piano Lauree Scientifiche), University of Pavia, Italy
- 2019 – 2019 Course taught – PhD Corse on scientific approach at University of Milan, Italy (2 CFU)
- 2019 – **Course taught – Materiali extraterrestri (Meteorites and their planetary bodies, M.Sc. degree, 6CFU), University of Pavia, Italy (students weighted average evaluation on the 3 courses 8.9/10)**
- 2019 – Course taught – Physical Properties of Rocks (co-teaching with RJ Angel and ML Mazzucchelli, M.Sc. degree, 6CFU), University of Pavia, Italy (students weighted average evaluation on the 3 courses 8.9/10)
- 2022 – Course taught – Lo sviluppo sostenibile nella transizione economica ecologica e sanitaria (EMMLOS Executive Master in Management strategico e Leadership delle Organizzazioni Sanitarie, 1CFU)

• **COMMISSIONS OF TRUST**

- 2011 – Reviewer for Acta Crystallographica section B (2011); American Mineralogist(2011); Mineralogical Magazine (2012); Physics and Chemistry of Minerals (2012), Science China (2014), Lithos (2014), Journal of Alloys and Compounds (2015), Frontiers in Earth Science (2015), Geophysical Research Letters (2016), Journal of the Geological Society of London (2017); Nature (2018), Energies (2018), Minerals (2018); Science Advances (2019); Journal of Metamorphic Geology (2020); UCL Open: Environment (2021); Nature Communications (2021)
- 2015 – Editorial board member for Frontiers (Earth and Planetary Material division)

- 2016 Guest editor for Lithos (for the special issue “The nature of diamonds and their use in Earth’s sciences)
- 2017 Proposal reviewer for EGU school applications
- 2018 – External PhD committee member, University of Padova
- 2018 – Proposal reviewer for DFG-grant applications
- 2020 – Editorial board member for Geosciences
- 2020 Member of the committee for the awards of the Associazione Italiana di Cristallografia (AIC)
- 2020 – Editorial board member for Minerals
- 2020 – Member of the *Commissione Comunicazione* for the Società Italiana di Mineralogia e Petrologia (SIMP)
- 2021 Evaluation committee for the recruitment of technical staff at the research office, University of Pavia
- 2021 Member of the committee for the awards of the Associazione Italiana di Cristallografia (AIC)
- 2021 – Proposal reviewer for Polish National Science Center
- 2021 Evaluation committee for the recruitment Researcher (RTDb), University of Milano Bicocca
- 2021 – Panel member for proposals submitted to the Polish National Science Center
- 2023 – Guest Editor for European Journal of Mineralogy

• **MEMBERSHIPS OF SCIENTIFIC SOCIETIES (in bold elective roles)**

- 2011 – Member, of the Italian Society of Mineralogy and Petrology (SIMP)
- 2012 – Member of the Mineralogical Society of America (MSA)
- 2013 – Member of the European Geoscience Union (EGU)
- 2017 – Member of the Italian Association for Crystallography (AIC)
- 2019 – Council Member of the Società Italiana di Mineralogia e Petrologia (SIMP)**
- 2022 – SIMP representative in the European Mineralogical Union (EMU)**

- **FELLOWSHIPS AND GRANTS (role in bold)** Several funded research projects as principal investigator (>2.3M€) and as co-PI or supervisor (>1M€). Several national and international funded research projects as team member. Principal investigator and co-investigator of funded applications for large scale facility usage.

- Funded research projects:

- 2006 – 2007 PRIN-MIUR: Studi sperimentali su materiali geologici alle alte pressioni e temperature: applicazioni alla comprensione del sistema Terra (PRIN 2006047943 - € 120,000 - PI: PF Zanazzi). **Team member.**
- 2008 – 2010 PRIN MIUR: Meteoriti marziane (nakhliti): storia termica e contenuto in acqua del pirosseno. Confronto con analoghi terrestri (PRIN 2007H8XWKC – 27,260€ - PI: M. Zema). **Team member.**
- 2010 – 2012 NSF Earth Science division (EAR): Structure-Based Thermodynamic Properties of Feldspars (EAR-0738692 - PI: N.L. Ross). **Post-doctoral fellow.**
- 2010 – 2013 Italian Space Agency: MARS-XRD/ExoMars (ASI n.l/060/10/0 - PI: L. Marinangeli). **Post-doctoral fellow.**
- 2011 – 2012 PRIN-MIUR: Dalle materie prime del Sistema Terra alle applicazioni tecnologiche: studi cristallografici e strutturali (PRIN-2010EARRRZ - € 469,693 - PI: M.F. Brigatti). **Team member.**
- 2013 – 2018 ERC Starting grant: Inclusion in diamond messenger from the Deep Earth (INDIMEDEA, ERC-StG n.307322 - € 1.423,464 - PI: F. Nestola). **Team member**
- 2014 – 2016 PNRA-PEA: Meteoriti Antartiche (2013/AZ2.04 - € 88,000 - PI: L. Folco). Team member.
- 2015 – 2018 Italian Space Agency: (TOMOX - ASI DC-EOS-2014-309 PI: L. Marinangeli). **Team member.**
- 2015 – 2018 SIR-MIUR: Mineral inclusion elasticity for a new deep subduction geobarometer (MILE DEEp, n.RBSI140351 - € 449,900). **Principal Investigator.** (50 publications, >50 conference abstracts)
- 2016 – 2018 PNRA-PEA: Meteoriti Antartiche (PNRA16_00029 - € 87,900 - PI: L. Folco). Team member.
- 2017 – 2022 ERC Starting grant: Determine the true depth of deep subduction from piezobarometry on host – inclusions systems (TRUE DEPTHS, ERC-StG n.714936 - € 1.697,500). **Principal Investigator.** (35 papers, >50 conference abstracts)
- 2018 – 2021 FARE-MIUR: Stacking disorder in diaMonds as a marker for the history of Pre-solar Carbon (IMPACT,

- 2019 – 2023 FARE-MIUR n. R164WEJAHH- € 234,255). **Principal Investigator**.
 PRIN-MIUR: The Dynamic Mass Transfer from Slabs to Arcs (Dynastars, PRIN-MIUR n. 2017ZE49E7 - € 384,084). **Co-PI** responsible for the research unit at University of Pavia.
- 2019 – 2022 PNRA-MIUR: Carbon minerals in Frontier Mountain ureilites of the Museo nazionale dell'Antartide, Siena, Italy (“Commander”, Programma Nazionale di Ricerca in Antartide - PNRA D.D. 1314 del 25/05/2018 PNRA18_00247 - A - € 58,200). **Co-PI**.
- 2019 – 2022 INAF-ASI: Olivine-Bearing UngrOupeD achondrIEtS and their parental bodies (“OL-Bodies”, Asi-Inaf 2018-16-HH.O). **Team member**.
- 2020 – 2022 NSF grant: “QUIZ Quartz-in-zircon: An elastic model for quantifying depth and time scales of crystallization and exhumation of Hadean zircon” (EAR-1952698, \$ 174,000, PI: J.P. Gonzalez). **Supervisor**.
- 2021 – 2023 “Progetto Infrastrutturale Regione Lombardia – Università di Pavia 2021” (DGR 4473/2021 - € 1.012.000). **Co-PI**
- 2022 – PRIN-MIUR: High-stress earTHquakes by fAuLting in dEep dry rockS (THALES, PRIN-MIUR N. 2020WPMFE9, € 398.514). **Co-PI** responsible for the research unit at University of Pavia
- 2023 – PRIN-MIUR: “Development of Digital TWInS for multiphysics simulation of eXtreme events in civil engineering” (DTWI, PRIN-MIUR N. 2022AL5MSN €231,350). **Co-PI** responsible for the research unit at University of Pavia
- 2024 – EU Marie Curie ExoDivers. **Supervisor**
- 2024 – Fondazione Cariplo: “Crystal Trigger: CRack nucleation bY shear STress Amplification in the Lower crust TRIGGERed by mineral polymorphic transition Crystal Trigger (2023-2431 – 148.947€). **Principal Investigator**

- Funded research projects at large scale facilities:

- 2013: Chromite inclusion in natural diamonds: a picture of deep earth (Diamond Light Source, DLS: I15 experiment number EE7616)
- 2014: Diopsides in diamonds: new geobarometric approaches (Diamond Light Source, DLS: I15 experiment number EE8754)
- 2015: The effect of cracking systems on diamond-inclusion geobarometry (Swiss Light Source, SLS: TOMCAT experiment number e15427)
- 2016: Coesite in Diamond: a unique piezothermometer for geology (Diamond Light Source, DLS: I19, experiment number EE14928)
- 2016: The smaller, the harder: multiphase micro-inclusions in majoritic garnet as signatures of deep Earth mantle conditions (Diamond Light Source, DLS: I15, experiment number EE14855)
- 2017: The smaller, the harder: multiphase micro-inclusions in majoritic garnet as signatures of deep Earth mantle conditions (Diamond Light Source, DLS: I15, experiment number EE14855_2)
- 2018: Bringing together growth mechanism and oxidation state in the environment of diamond formation (Swiss Light Source, SLS: TOMCAT proposal ID: 20180858)
- 2019: Resolving the origin of mantle eclogites by in-situ diffraction of mineral inclusions (Elettra, XPRESS proposal ID: 20190101)
- 2020-2022: Measuring paleostress in the Earth's crust by in-situ diffraction of mineral inclusions (Elettra, XPRESS proposal ID: 20200057)
- 2022: Synchrotron source single crystal x-ray diffraction of quartz inclusions in zircon for the determination of depths of inclusion entrapment in 4 billion-year-old zircon (PSI X04SA Proposal number 20220373).

- **MENTORING ACTIVITIES:** Advisor and Co-advisor for >50 students (BSc, MSc, PhD and post-docs)

- Postdoctoral researchers (13 researchers)

- 2017 – 2018 Claudia Stangarone, Ab-initio calculations, crystallography [now at DLR Germany]
- 2017 – 2023 Mattia Gilio, metamorphic petrology, geochemistry [Humboldt fellow, now at University of Hamburg]
- 2017 – 2021 Marco Piazzì, solid state physics, magnetism [now high school teacher]

- 2018 – 2020 Mattia Luca Mazzucchelli, Finite Element Modeling [Humboldt fellow now at University of Lausanne]
 2018 – 2019 Davide Comboni, complex structures at high-P and T [now RTDa at University of Milan]
 2019 – 2020 Davide Novella, synthesis at high-P and T [now RTDb at University of Padova]
 2019 – 2020 Mara Murri, DFT on mineral inclusions [Humboldt fellow now RTDa at University of Pavia]
 2019 – 2021 Mattia Bonazzi, geochemistry of mineral inclusions [now postdoctoral fellows at IGG-CNR]
 2020 – 2023 Joseph P. Gonzalez, mineral inclusions in non-cubic host, [now postdoctoral fellow at University of Wisconsin - Madison]
 2021 – 2022 Hugo van Schrojenstein Lantman, microscale deformation of mineral inclusions, [Now postdoctoral fellow at University of Oslo]
 2021 – 2021 Marta Morana, x-ray diffraction on mineral inclusions, [now RTDa at University of Firenze]
 2021 – 2022 Nicola Mari co-funded with INAF, Mercury surface analogue
 2023 – Oliver Christ, carbon phases in ureilites

- Graduate students (PhD, 11 students)

- 2013 – 2016 *Lorenzo Scandolo*: Thermal expansion of mantle minerals inclusions in diamonds. Now at IGI - Istituto Gemmologico Italiano.
 2015 – 2018 *Mattia L. Mazzucchelli*: Finite Element Modelling (FEM) of elastic anisotropy for host inclusion systems. [Humboldt fellow, now postdoctoral fellow at University of Lausanne].
 2016 – 2019 *Nicola Campomenosi*: Elastic thermobarometry: methods and applications to ultra-high pressure metamorphic rocks (co-supervised at University of Genova). [Humboldt fellow, Now RTDa at University of Genova]
 2016 – 2019 *Mara Murri*: Raman investigation of inclusion under non-hydrostatic deviatoric stress. [Humboldt fellow, Now RTDa at University of Pavia]
 2016 – 2019 *Gabriele Zaffiro*: Elastic properties of UHP metamorphism index minerals.
 2016 – 2019 *Mattia Bonazzi*: Synthesis of host-inclusion systems under known stress-T conditions: Investigation of the validity of single inclusion piezobarometry using experimentally produced UHPM rocks analogous. Now postdoc at IGG-CNR
 2017 – 2020 *Hugo van Schrojenstein Lantman*: Elastic geobarometry: bringing back together P-T-t paths and deformation history of Lago di Cignana and Western Gneiss Region, Norway. Now postdoctoral fellow at Univ of Oslo
 2017 – 2020 *Marta Morana*: Structure and properties of crystalline inclusions trapped in minerals. Now RTDa at Earth Science Dept., University of Florence
 2021 – *Biswabhanu Puhan*: 3D numerical modeling of complex host inclusion systems.
 2021 – *Lisa Baratelli*: Clinopyroxene mineral inclusion in garnet hosts. [University of Milan, supervised by F. Càmarà]
 2022 – *Giulia Mingardi*: Quartz alpha-beta transition. [Ecole Normale Supérieure, Paris, supervised by A. Schubnel]

- Master students (second level master degree, 5 students)

- 2022 – 2023 *Elena Tropiano*: Ipotesi di un nuovo ospedale ecosostenibile alla luce del nuovo modello organizzativo previsto dal PNRR. [Master Universitario Di II Livello Management Strategico E Leadership Delle Organizzazioni Sanitarie]
 2022 – 2023 *Sara Cutti*: Progetti innovativi per la riduzione dei consumi, degli sprechi e degli impatti ambientali nelle Strutture Sanitarie, ospedaliere e territoriali. [Master Universitario Di II Livello Management Strategico E Leadership Delle Organizzazioni Sanitarie]
 2022 – 2023 *Pietro Imbrogno*: Progetti innovativi per la riduzione dei consumi, degli sprechi e degli impatti ambientali nelle Strutture Sanitarie, ospedaliere e territoriali. [Master Universitario Di II Livello Management Strategico E Leadership Delle Organizzazioni Sanitarie]
 2022 – 2023 *Stefania Russo*: Progetti innovativi per la riduzione dei consumi, degli sprechi e degli impatti ambientali nelle Strutture Sanitarie, ospedaliere e territoriali. [Master Universitario Di II Livello Management Strategico E Leadership Delle Organizzazioni Sanitarie]
 2022 – 2023 *Maria Savino*: Progetti innovativi per la riduzione dei consumi, degli sprechi e degli impatti ambientali nelle Strutture Sanitarie, ospedaliere e territoriali. [Master Universitario Di II Livello Management Strategico E Leadership Delle Organizzazioni Sanitarie]

• Undergraduate students (M.Sc. and B.Sc. 23 Students)

- 2013: *Davide Comboni*: New thermoelastic parameters, thermal expansion behaviour and dehydration of cancrinite (B.Sc. July 2013).
 Mattia Luca Mazzucchelli: Diamond inclusions: new thermoelastic parameters for pyrope (B.Sc. July 2013).
- 2014: *Mara Murri*: Critical reassessment of the thermoelastic properties for diamond (B.Sc. July 2014).
 Greta Rustioni (now postdoctoral fellow at University of Bayreuth): The role of fractures on the entrapment pressure for diamond-inclusion pair (B.Sc. September 2014).
- 2015: *Gabriele Zaffiro*: Development of a new resistance furnace for in situ high temperature single-crystal X-Ray diffraction (B.Sc. January 2015).
 Matteo Di Prima (Now at ENI): Almandine garnet at high-temperature: the role of controlled oxygen fugacity (B.Sc. July 2015).
 Mattia Luca Mazzucchelli: Pressure of formation determination for host-inclusion system (M.Sc. July 2015)
- 2016: *Mara Murri*: Geothermometer calibration for augites. Partially funded by The Barringer award for Impact related research (M.Sc. July 2016).
 Greta Rustioni: Brittle deformation in minerals (M.Sc. July 2016)
 Gabriele Zaffiro: Characterization of the stress distribution in synthetic host-inclusion pairs (M.Sc. July 2016).
- 2017: *Vanessa Fontana*: Rubies from Madagascar and Sri Lanka (M.Sc. July 2017)
- 2018: *Pietro Bernocchi*: Raman spectroscopy of zircon inclusions in Dora Maira Garnets (B.Sc. February 2018)
- 2018: *Mattia La Fortezza*: Inclusioni multifase in harzburgiti della Cordigliera Betica (Almirez, Spagna): meccanismi di crescita e orientazione di magnetite in olivina (co-supervised with N. Malaspina and M. Campione)
- 2018: *Federico Vercesi*: Magnetic properties of inclusions in diamonds (B.Sc. December 2018)
- 2019: *Zeno Geddo*: FEM modeling for multiple inclusions (co-supervised with M.L. Mazzucchelli)
- 2019: *Alice Girani*: Structural refinement for crystalline inclusions trapped in their host (co-supervised with R.J. Angel)
- 2020: *Edoardo Mangieri*: Geotermometria intracristallina e geospeedometria su cristalli di clinopirosseno provenienti da gabbri abissali campionati presso l'IODP hole U1473A (Atlantis Bank, south west indian ridge) (co-supervised with A. Sanfilippo and M. Murri)
- 2020: *Katriel Bernabè* (Ing. Edile e Architettura): Metodi computazionali per la determinazione del tensore di rilassamento per sistemi host-inclusione anisotropi in applicazioni di geobarometria elastica (co-supervised with S. Morganti, M.L. Mazzucchelli e A. Reali)
- 2020: *Kira Musyachenko*: Ab initio calculations and Raman measurements of inclusions in garnets
- 2020: *Elia Cattaneo*: (co-supervised with M.C. Domeneghetti, M. Murri and A. Barbaro)
- 2020: *Giulia Mingardi*: Mineral inclusions in garnet megablast from Dora Maira (co-supervised with M.C. Domeneghetti, C. Chopin and N. Campomenosi)
- 2021: *Zeno Geddo*: FEM modeling for multiple inclusions (co-supervised with M.L. Mazzucchelli)
- 2021: *Alice Girani*: pressure and temperature estimates for Lago di Cignana samples using elastic barometry (co-supervised with R.J. Angel and Mattia Gilio)
- 2021: *Biswabanu Puhan*: Numerical model for fracture analyses (co-supervised with Prof. A. Reali)

• **BIBLIOMETRIC RECORDS:**

- 114 Research publications in ISI journals (62 in the past 5 years)
- 5 Invited and review articles
- 1 book chapter
- >200 scientific communications to national and international conferences

17	invited and keynote talks and seminar to national and international conferences and institutions
>3000	total citations (>2000 in the past 5 years) [scopus];
>4000	total citations (>2000 in the past 5 years) [google scholar]
28	H-index [scopus]
32	H-index [google scholar]

- **PUBLICATIONS IN PEER-REVIEWED JOURNALS:** 114 publications in high-ranked international peer reviewed journals with more than 3000 citations in the past 5 years.

2007.

1. Fioretti A.M., Domeneghetti M.C., Molin G., Cámara F., **Alvaro M.**, Agostini L. (2007) - Reclassification and thermal history of Trenzano chondrite. *Meteoritics & Planetary Science*, 42: 10 (IF:2.371).

2010.

2. **Alvaro M.**, Nestola F., Ballaran T.B., Camara F., Domeneghetti M.C., and Tazzoli V. (2010) High-pressure phase transition of a natural pigeonite. *American Mineralogist*, 95(2-3): 300-311 (IF:2.026).
3. Redhammer G.J., Cámara F., **Alvaro M.**, Nestola F., Tippelt G., Prinz S., Simons J., Roth G. and Amthauer G. (2010) Thermal expansion and high-temperature P_{21/c}-C_{2/c} phase transition in clinopyroxene-type LiFeGe₂O₆ and comparison to NaFe(Si,Ge)₂O₆. *Physics and Chemistry of Minerals*, 37(10): 685-704 (IF: 1.876).

2011.

4. **Alvaro M.**, Nestola F., Cámara F., Domeneghetti M.C., And Tazzoli V. (2011) High-pressure displacive phase transition of a natural Mg-rich pigeonite. *Physics and Chemistry of Minerals*, 38(5): 379-385 (IF: 1.730).
5. **Alvaro M.**, Cámara F., Domeneghetti M.C., Nestola F., And Tazzoli V. (2011) HT P_{21/c} to C_{2/c} phase transition and kinetics of Fe²⁺-Mg order-disorder of an Fe-poor pigeonite: implications for cooling history of ureilites. *Contributions to Mineralogy and Petrology*, 163(3): 599-613. (IF: 3.441)
6. Gatta G.D., Angel R.J., Zhao J., **Alvaro M.**, Rotiroti N., Carpenter M.A. (2011) Phase-stability, elastic behavior and pressure-induced structural evolution of kalsilite: a ceramic material and high-T/high-P mineral. *American Mineralogist*, 96(8-9): 1363-1372 (IF:2.169).

2012.

7. Gatta G.D., **Alvaro M.**, Bromiley G. (2012) A low temperature X-ray single-crystal diffraction and polarised infra-red study of epidote. *Physics and Chemistry of Minerals*, 39(1), 1-15 (IF: 1.304).
8. Periotto B., Nestola F., Balic-Zunic T., Pasqual D., **Alvaro M.**, Ohashi H. (2012) High-pressure systematic of NaMe³⁺Si₂O₆ silicates. *Solid State Communication*, 152(2): 132-137 (IF: 1.534).
9. **Alvaro M.**, Angel R.J., Cámara F. (2012) High-pressure behaviour of zoisite. *American Mineralogist*, 97: 1165-1176 (IF:2.204).

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93. Mattia Gilio, Marco Scambelluri, Ross J Angel, **Matteo Alvaro** (2021) The contribution of elastic geobarometry to the controversy of HP vs. UHP metamorphism. *Journal of Metamorphic Geology*, in press [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
94. Alix M. Ehlers, Gabriele Zaffiro, Ross J. Angel, Tiziana Boffa-Ballaran, Michael A. Carpenter, **Matteo Alvaro**, Nancy L. Ross (2021) Thermoelastic properties of zircon: implications for geothermobarometry. *American Mineralogist*, in press. [714936: TRUE DEPTHS]

95. Anna Barbaro, Fabrizio Nestola, Lidia Pittarello, Ludovic Ferrière, Mara Murri, Konstantin Litasov, Oliver Christ, **Matteo Alvaro**, and Maria Domeneghetti (2021) Characterization of carbon phases in Yamato 74123 ureilite to constrain the meteorite shock history. *American Mineralogist*, in press [R164WEJAHH: IMPACT]
96. Rick Verberne, Hugo W van Schrojenstein Lantman, Steven M Reddy, **Matteo Alvaro**, David Wallis, Denis Fougereuse, Antonio Langone, David W Saxey, William DA Rickard (2022) Trace-element heterogeneity in rutile linked to dislocation structures: Implications for Zr-in-rutile geothermometry. *Journal of Metamorphic Geology*, in press
97. Angel RJ, **Alvaro M.**, Nestola F (2022) Crystallographic methods for non-destructive characterization of mineral inclusions in diamonds. *Reviews in Mineralogy and Geochemistry*, 88 (1), 257-305. [714936: TRUE DEPTHS]
98. Pauline Jeanneret, Iwona Klonowska, Christopher Barnes, Jarosław Majka, Johanna Holmberg, Mattia Gillio, William Nachlas, **Matteo Alvaro**, Karolina Kościńska, Henning Lorenz, Thomas Zack, Anna Ladenberger, Hemin Koyi (2022) Deciphering the tectonometamorphic history of subducted metapelites using quartz-in-garnet and Ti-in-quartz (QuiG–TiQ) geothermobarometry—A key for understanding burial in the Scandinavian Caledonides, *Journal of Metamorphic Geology*.
99. Tingting Gu, Martha G Pamato, Davide Novella, **Matteo Alvaro**, John Fournelle, Frank E Brenker, Wuyi Wang, Fabrizio Nestola (2022) Hydrous peridotitic fragments of Earth’s mantle 660 km discontinuity sampled by a diamond. *Nature Geoscience*
100. Yuuki Hagiwara, Ross J Angel, Junji Yamamoto, **Matteo Alvaro** (2022) Equation of state of spinel (MgAl₂O₄): constraints on self-consistent thermodynamic parameters and implications for elastic geobarometry of peridotites and chromitites. *Contributions to Mineralogy and Petrology*

2023.

101. Nicola Campomenosi, Ross J Angel, **Matteo Alvaro**, Boriana Mihailova (2023) Resetting of zircon inclusions in garnet: Implications for elastic thermobarometry. *Geology*
102. Michele Cassetta, Francesco Vetere, Marco Zanatta, Diego Perugini, **Matteo Alvaro**, Beatrice Giannetta, Claudio Zaccone, Nicola Daldosso (2023) Micro-Raman spectroscopy for a comprehensive understanding of the structural evolution of Basaltic-Andesite and Trachybasalt multiphase systems. *Chemical Geology*
103. Matthew J Kohn, Mattia L Mazzucchelli, **Matteo Alvaro** (2023) Elastic Thermobarometry. *Annual Review of Earth and Planetary Sciences* 51, 331-366.

● **ORGANIZATION OF SCIENTIFIC MEETINGS:** Member of the organizing committee and convener for several national and international congresses, workshops and other scientific meetings.

- | | |
|------|---|
| 2015 | Member of the committee for the organization and lecturer for International Diamond School “The nature of diamonds and their use in Earth’s study”. Bressanone-Brixen, 27-31st January 2015. |
| 2015 | Co-convener for the session “High-pressure and high-temperature mineral physics: a link between petrology, geophysics and geodynamics” (GMPV3.2) at EGU 2015 (European Geoscience Union 2015), Wien. |
| 2015 | Co-convener for the session “Inclusion-host systems: melt, fluid and solid inclusions and their importance in Earth Sciences” (GMPV4.2) at EGU 2015 (European Geoscience Union Assembly 2015), Wien. |
| 2015 | Member of the committee for the organization of the EosFit Workshop at 29th European Crystallographic Meeting (ECM-2015) in Rovinj, Croatia. |
| 2016 | Sponsorship organization committee for EMC 2016 (European Mineralogical Conference 2016), Rimini. |
| 2016 | Convener for session “Inclusions in minerals as record of geological processes: new analysis methods and application” (S9) at EMC 2016 (European Mineralogical Conference 2016), Rimini. |
| 2016 | Member of the committee for the organization and lecturer for the workshop “Inclusions in minerals as record of geological processes: New analysis methods and application” at EMC 2016 (European Mineralogical Conference 2016), Rimini. |
| 2017 | Convener for session “Inclusions in minerals: a record of geological processes” at EGU 2017 (European Geoscience Union Assembly 2017), Wien. |
| 2017 | Co-convener for the session “Metamorphic and melting processes: from subduction zones to ultra- |

- high temperature terranes” at Goldschmidt 2017, Paris.
- 2017 Convener for the session “An entire rock entrapped inside a mineral grain. What we can learn from it?” at SIMP, Pisa.
- 2018 Member of the committee for the organization and lecturer for the International Diamond School “Diamonds: Geology, Gemology and Exploration”. Bressanone-Brixen, 29th January – 2nd February 2018.
- 2019 Co-convener for session “At the limits of geoscience: the nanoscale control of the solid Earth” at EGU 2019 (European Geoscience Union Assembly 2019), Wien.
- 2019 Member of the organization and scientific committee for the Fifth Meeting of the Italian (AIC) and Spanish Crystallographic (GE3C) Associations (MISCA V), Naples.
- 2020 Co-convener for session “The Big Fat Session of the Year: Microstructures, a Journey into Tiny Things” at EGU 2020 (European Geoscience Union Assembly 2020), Wien.
- 2020 Member of the scientific committee for 1st GCI@HomeEvent 2020
- 2021 Co-Convener for session “Are inclusions petrologists’ best friends?” at EMC2020 Krakow, Poland
- 2022 Co-Convener for session “Stressed minerals and rocks: witnesses from the earth interior” at SGI-SIMP 2022, Turin, Italy
- 2023 Scientific committee member for the 18th International Symposium on Experimental Mineralogy, Petrology and Geochemistry (EMPG-XVIII), Milan, Italy.
- 2024 GeoVibrs, Como, Italy

- **MEETINGS CONFERENCES, SEMINARS AND WORKSHOPS:** More than 200 contributions to national and international conferences and several invited talks and seminars

2005.

1. **Alvaro M.**, Cámara F., Domeneghetti M.C., Pistorino M., Zema M., Tazzoli V. Cinetica del processo di ordine-disordine Fe²⁺ - Mg in una pigeonite P21/c povera in ferro. **GEOITALIA-FIST 2005** - Quinto Forum Italiano di Scienze della Terra, Sept. 21-23rd 2005. Spoleto, Italy.
2. Domeneghetti, M., Cámara, F., Fioretti, A., Molin, G., **Alvaro, M.**, and Agostini, L. (2005) Reclassification and thermal history of Trenzano chondrite. **GEOITALIA-FIST 2005** - Quinto Forum Italiano di Scienze della Terra, Sept. 21-23rd 2005. Spoleto, Italy.

2007.

3. **Alvaro M.**, Nestola F., Boffa Ballaran T., Cámara F., Domeneghetti M. C., Tazzoli V. High-pressure phase transition and crystal structure evolution of natural pigeonite. **GEOITALIA 2007**, Sept. 11 – 14th 2007. Rimini, IT
4. **Alvaro M.**, Cámara F., Nestola F., Ohashi H. Solid solution of (R3+Li) molecule in Pbca pyroxene. **GEOITALIA 2007**, Sept. 11 – 14th 2007. Rimini, IT
5. **Alvaro M.**, Cámara F., Domeneghetti M.C., & Tazzoli V. P21/c → C2/c phase transition and kinetics of Fe²⁺-Mg order-disorder in Fe-poor P₂1/c pigeonite. **SMEC2007**, Apr. 15 – 20th 2007. Miami, FL
6. DMG-Short Course “Doktorandenkurs”: “High-Pressure Experimental Techniques and Applications to the Earth’s Interior”. Feb. 19 – 24th 2007. Bayreuth, D

2008.

7. F. Nestola, F. Cámara, **M. Alvaro**, M.C. Domeneghetti, V. Tazzoli, H. Ohashi. High-pressure behaviour of a Li-bearing orthopyroxene. **1st SIMP-AIC joint meeting**, Sept. 7-12th 2008. Sestri levante (GE), I
8. G.J. Redhammer, F. Cámara, **M. Alvaro**, F. Nestola, H. Ohashi. High-temperature P21/c – C2/c phase transition of LiFe₃+Ge₂O₆. **1st SIMP-AIC joint meeting**, Sept. 7-12th 2008. Sestri levante (GE), I
9. Short course: Mineral physics at non-ambient conditions (R. Miletich). Jul. 8 – 12th 2008. Milan, IT
10. **Alvaro M.**, Nestola F., Boffa Ballaran T., Cámara F., Domeneghetti M. C., Tazzoli V. HP – phase transition of a natural P21/c pigeonite: spontaneous strain and structure evolution. **EGU 2008**, Apr. 11 – 18th 2008. Wien, A

11. **Alvaro M.**, Nestola F., Boffa Ballaran T., Cámara F., Domeneghetti M. C., Tazzoli V. HP study of a natural pigeonite. International school of mineralogy 2008: "HP-HT Mineral Physics: implications for geosciences". Feb. 11 – 15th 2008. Bressanone, IT

2009.

12. **Alvaro M.**, Nestola F., Cámara F., Domeneghetti M. C., Tazzoli V. Composition Vs transition pressure: a model for clinopyroxenes. **GEOITALIA 2009**, Sept. 9 – 11th 2009. Rimini, IT
13. Nuove applicazioni della spettroscopia raman nei minerali. (New application of raman spectroscopy to minerals). **Workshop GNM**, Feb. 12th 2009. Parma, IT

2010.

14. Angel R.J., Ross N., Sochalski-Kolbus L.M., and **Alvaro M.** Structure-based thermodynamic properties of feldspars. **2010 GSA Annual meeting**, Oct 31st – Nov 3rd 2010. Denver, CO, USA
15. Cámara F., **Alvaro M.**, Gatta G.D., R.J. Angel. HT-study of the P31c ↔ P63 phase transition in kalsilite, KAlSiO₄. **SIMP 2010**, Sept 13th – 17th 2010 Ferrara, Italy
16. **Alvaro M.**, Cámara F., Gatta G.D., R.J. Angel. Elastic behaviour of zoisites and their geological implications. **SIMP 2010**, Sept 13th – 17th 2010 Ferrara, Italy
17. Periotto B., Nestola F., Balic-Zunic T., Pasqual D., **Alvaro M.** High-pressure systematic of NaMe₃Si₂O₆ pyroxenes: volume compression vs Me₃₊ cation radius. **EGU 2010**, May 2nd – 7th 2010 Wien, A
18. "Software fayre: going from raw data to hkl file". **ECM26 2010 Workshop**, Aug 29th – Sept 5th 2010 Darmstad, D. *Invited talk*
19. **Alvaro M.**, Nestola F., Cámara F., Domeneghetti M. C., Tazzoli V. and R.J. Angel. P21/c to C2/c phase transition in clinopyroxenes and the geodynamic implications. **ECM26 2010**, Aug 29th – Sept 5th 2010 Darmstad, D
20. **Alvaro M.**, Nestola F., Cámara F., Domeneghetti M. C., Tazzoli V. and R.J. Angel. Phase transition mechanisms in clinopyroxenes under non-ambient conditions. **ACA 2010**, Jul 24th – 29th 2010. Chicago, USA

2011.

21. Gatta, G.D., **Alvaro M.**, Bromiley G. The effects of temperature on the crystal structure of a natural epidote. **Geotalia 2011**, Sept 19th – 23rd 2011. Turin, I
22. VT meeting series: Series of weekly seminars organized by the geosciences department at Virginia Tech. 2010-2011, Blacksburg, USA

2012.

23. Arletti R., Quartieri S., Vezzalini G., **Alvaro M.**, Càmara F. A New Zeolite Topology Deriving From Levyne Dehydration. **OXYDE 2012**, Sep 23rd - 27th 2012. Turin, I
24. Domeneghetti M.C., Fioretti A.M., Cámara F., McCammon C., **Alvaro M.** Thermal history of nakhilites: a comparison between MIL03346 and its terrestrial analogue Theo's flow. **EMC 2012**, Sep 2nd – 6th 2012. Frankfurt, D
25. Arletti R., Quartieri S., Vezzalini G., **Alvaro M.**, Càmara F. Dehydration dynamics of levyne: a combined synchrotron XRPD and single crystal diffraction study. **EMC 2012**, Sep 2nd – 6th 2012. Frankfurt, D

2013.

26. Ferrari S., Nestola, F., Helbert, J., Maturilli, A., D'Amore, M., **Alvaro, M.**, Domeneghetti, M., Massironi, M., Hiesinger, H. Calcium pyroxenes at Mercurian surface temperatures: investigation of in-situ emissivity spectra and thermal expansion. **AGU Fall meeting 2013**, December 9-13th 2013. San Francisco, CA, USA
27. F. Cámara, D. Comboni, D.G. Gatta, **M. Alvaro**, P. Lotti. New Thermal Expansion Parameter And Dehydration Behavior Of Cancrinite. **ECM 28**, Aug 25th – 29th 2013. Warwick, UK
28. P. Lotti, G.D. Gatta, D. Comboni, **M. Alvaro**, F. Cámara, N. Rotiroti. Cancrinite-group minerals ([CAN]-framework type) at non-ambient conditions. **GIC-AIZ 2013**, Sept 15th – 18th 2013. Riccione, I
29. **M. Alvaro**. The role of mineral physics for the understanding of the Earth and planetary bodies. *Invited seminar speaker*. Jul 2013. Pavia, I

30. Rossella Arletti, Simona Quartieri, Giovanna Vezzalini, **Matteo Alvaro**, Fernando Cámara. Dehydration dynamics of levynite: evidence for a new zeolite topology. **AIZ 2013**, Jul 7th – 12th 2013. Moscow, RU
31. **M. Alvaro**. The role of mineral physics for the understanding of the Earth and planetary bodies. *Invited seminar* speaker. May 2nd – May 4th 2013. Chieti, I.
32. Sula Milani, Matteo Mazzucchelli, Fabrizio Nestola, **Matteo Alvaro**, Ross J. Angel, Charles A. Geiger, and Chiara Domeneghetti. The P-T conditions of garnet inclusion formation in diamond: thermal expansion of synthetic end-member pyrope (pico). **EGU 2013**, Apr 7th – 12th 2013. Wien, A

2014.

33. **M. Alvaro**, R.J. Angel, M.L. Mazzucchelli, F. Nestola, M.C. Domeneghetti. Isomekes: Fundamental tool to determine the formation pressure for the diamond-inclusion pair. **EGU 2014**, April 27th May 2nd 2014. Wien, A
34. R.J. Angel, **M. Alvaro**, M.L. Mazzucchelli, P. Nimis, and F. Nestola. How much differential stress can a rock support? **EGU 2014**, April 27th May 2nd 2014. Wien, A
35. Casati N., Nestola F., **Alvaro M.**, Wilhelm H., Kleppe A., Nimis P., Harris J.W. Clinopyroxenes still trapped in diamonds: high-energy synchrotron X-ray diffraction as a chemical probe. **EGU 2014**, April 27th May 2nd 2014. Wien, A
36. P. Lotti, G.D. Gatta, V. Kahlenberg, M. Merlini, **M. Alvaro**, and F. Cámara (2014) Cancrinite-group minerals behavior at non-ambient conditions. **EGU 2014**, April 27th May 2nd 2014. Wien, A
37. J.Gonzalez-Platas, R.J. Angel, **M. Alvaro**, F. Nestola. EosFit7: A new program for equation of state analyses and calculations. **DGK 2014**, March 17th – 20th 2014. Berlin, D
38. F. Cámara, M. E. Ciriotti, E. Bittarello, **M. Alvaro**. New data on the crystal-chemistry of arrojadite: an HT study. **IMA 2014**, Sep. 1st – 5th 2014. Gauteng, South Africa.
39. Fioretti AM, **Alvaro M.**, Domeneghetti M.C., Marinangeli, L. (2014) New augite geothermometer for Nakhilites. **77th Annual Meeting of the Meteoritical-Society**. Sep. 8th – 13th 2014. Casablanca, Morocco. Meteoritics & Planetary Science 49, A118.
40. Paolo Lotti, G. Diego Gatta, Marco Merlini, Fernando Cámara, Nicola Rotiroti, Davide Comboni, **Matteo Alvaro**. Cancrinite-group minerals at non-ambient conditions: a model of the thermo-elastic and structure behavior. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
41. Malaspina N., **Alvaro M.**, Nestola F. Slab-derived fluid phase precipitation at high pressures. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
42. Lorenzo Scandolo, Mazzucchelli M.L., Chiara M. Domeneghetti, **Matteo Alvaro**, Fabrizio Nestola, Francesco Pandolfo. Thermal expansion behavior of orthopyroxenes: the role of the Fe-Mn substitution. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
43. Domeneghetti M.C., Alvaro M., Fioretti A.M., Cámara F., Marinangeli L. New augite geothermometer for nakhilites. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
44. Milani S., **Alvaro M.** & Nestola F. Diamond-garnet geobarometry using isomekes: the role of garnet compressibility and thermal expansion. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
45. Nestola F., **Alvaro M.**, Nimis P., Angel R.J., Milani S., Bruno M., Prencipe M. & Harris J.W. Diamond-olivine host-inclusion system: crystallography and depth of formation. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
46. **Alvaro M.**, Angel R.J., Mazzucchelli M.L., Nestola F. & Nimis P. Isomekes: a chemically-independent method for geobarometry of UHPM rocks. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
47. Mazzucchelli M.L., Angel R.J., **Alvaro M.**, Nestola F. & Nimis P.: Geobarometry for host-inclusion systems: the role of elastic relaxation. **SIMP-SGI 2014**, Sep. 10th -12th 2014. Milano, I.
48. Ross J. Angel, Javier Gonzalez-Platas, **Matteo Alvaro**, Fabrizio Netsola. EosFit7: A new program for equation of state analysis. **2nd Joint AIC-SILS conference**, Sep. 15th -18th 2014. Florence, I.

2015.

49. **Alvaro M.**, Domeneghetti M.C., Fioretti A.M.. Pyroxenes Fe-Mg exchange reaction and its application to planetary studies. **XII Congresso Nazionale di Scienze Planetarie**, Feb 2nd-6th 2015. Bormio, I
50. **M. Alvaro**. Thermal expansion measurements on single crystals. April 2015. **Invited seminar**. PhD programme of the "Fakultät für Geowissenschaften, Geographie und Astronomie" University of Wien, A.
51. Mattia L. Mazzucchelli, Ross Angel, **Matteo Alvaro**, Paolo Nimis, Chiara Maria Domeneghetti and Fabrizio Nestola. Elastic geobarometry for ultra-high pressure metamorphic (UHPM) rocks **EGU 2015**, April 12th 17th 2015. Wien, A
52. N. Malaspina, **M. Alvaro**, M. Campione, and F. Nestola. Dynamics of mineral crystallization at inclusion-garnet interface from precipitated slab-derived fluid phase: first in-situ synchrotron X-ray measurements **EGU 2015**, April 12th 17th 2015. Wien, A
53. P. Nimis, F. Nestola, R.J. Angel, S. Milani, **M. Alvaro**, C. Anzolini, M. Schiazza, M. Bruno, M. Prencipe, J.W. Harris, and M.T. Hutchison. Crystallographic relationships between diamond and its inclusions **EGU 2015**, April 12th 17th 2015. Wien, A
54. N. Malaspina, **M. Alvaro**, M. Campione, and F. Nestola. How Mineral Infillings Crystallize In Multiphase Inclusions From UHP Fluid Phase: First In Situ Synchrotron X-ray Measurements. European Current Research on Fluid Inclusions (**ECROFI-XXIII**)
55. **M. Alvaro**, R.J. Angel, C. Marciano, S. Milani, L. Scandolo, M.L. Mazzucchelli, G. Zaffiro, G. Rustioni, M. Briccola, M.C. Domeneghetti, F. Nestola. A new micro-furnace for "in situ" high-temperature single crystal X-ray diffraction measurements **ECM 2015**, August 22nd – 29th 2015, Rovinj, HR.
56. Scandolo L., **Alvaro M.**, McCammon C., Milani S., Di Prima M., Domeneghetti M.C., Nestola F. The role of oxidation on the high-temperature behavior of almandine. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
57. G. Zaffiro, R.J. Angel, **M. Alvaro**, F. Nestola, M.C. Domeneghetti, L. Scandolo, M.L. Mazzucchelli, S. Milani, G. Rustioni, C. Marciano. New micro-furnace for "in situ" high-temperature single crystal X-ray diffraction measurements. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
58. **M. Alvaro**, R.J. Angel, M.L. Mazzucchelli, M.C. Domeneghetti, F. Nestola. Elastic geobarometry for UHPM rocks: A link between mineralogy and petrology. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
59. Murri M., Scandolo L., **Alvaro M.**, Domeneghetti M.C., Fioretti A.M. Clinopyroxene Fe-Mg exchange reaction applied to Martian nakhlites. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
60. G. Rustioni, R.J. Angel, S. Milani, M.L. Mazzucchelli, P. Nimis, M.C. Domeneghetti, F. Marone, **M. Alvaro**, J.W. Harris, F. Nestola. Elastic geobarometry for host-inclusion systems: Pressure release and the role of brittle failure. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
61. S. Milani, L. Scandolo, G. Zaffiro, M. Di Prima, M.L. Mazzucchelli, **M. Alvaro**, M.C. Domeneghetti, F. Nestola. On the determination of the entrapment pressure for garnet inclusions in diamond. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
62. M.L. Mazzucchelli, R.J. Angel, **M. Alvaro**, P. Nimis, M.C. Domeneghetti, F. Nestola. Host-inclusion geobarometry for ultra-high pressure metamorphic (UHPM) rocks. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
63. S. Ferrari, **M. Alvaro**, F. Nestola, A. Maturilli, J. Helbert, M. C. Domeneghetti, M. Massironi and F. Zorzi. Thermal Expansion of C2/c Pyroxenes: Implications for the Thermal Infrared Spectroscopy of Solar System Bodies. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 2nd - 4th 2015. Florence, I
64. Chiara Anzolini, Fabrizio Nestola, Antony D. Burnham, Luca Peruzzo, Leonardo Tauro, **Matteo Alvaro**, Michael J. Walter, Mickey Gunther and Simon C. Kohn Diffraction and spectroscopic characterization of jeffbenite: a high-pressure marker in diamonds. **ECMS 2015**. September 9-11th 2015. Rome, I

65. Niccolò Menegoni, Fabrizio Nestola, **Matteo Alvaro** and Sula Milani. A combined micro-Raman spectroscopy and single-crystal X-ray diffraction approach: an example on natural and synthetic garnets. **ECMS 2015**. September 9-11th 2015. Rome, I
66. S. Milani, F. Nestola, **M. Alvaro** and V. Stagno. Diamond-eclogitic garnet pair: A test case to elastic geobarometry. **Goldschmidt 2015**.
67. Jones Adrian, Fabrizio Nestola, **Matteo Alvaro**, David Price. High-pressure shock behavior of diamond, laboratory experiments, synchrotron characterization and application to natural systems: examples and discussion. **CECAM** (Carbon at extreme conditions). October 26th - 30th 2015. Lugano, Swiss.
68. Nimis, P., Angel, R.J., Alvaro, M., Nestola, F. From mineralogy to petrology: The example of diamond and its inclusions. **Geologia delle Alpi**, Venezia November 20th 2015. Rendiconti Online Societa Geologica Italiana, 37, 47-49.

2016.

69. **M. Alvaro**, R.J. Angel, C. Marciano, G. Zaffiro, L. Scandolo, M.L. Mazzucchelli, S. Milani, G. Rustioni, C.M. Domeneghetti, and F. Nestola. Development of a new micro-furnace for "in situ" high-temperature single crystal X-ray diffraction measurements. **24th Annual Meeting of the German Crystallographic Society (DGK)**, March 14th – 17th 2016, Universität Stuttgart, D.
70. R.J. Angel, **M. Alvaro**, P. Nimis, M.L. Mazzucchelli, F. Nestola. Single Inclusion Piezobarometry Reveals High-temperature decompression path for Variscan Granulites. **EGU 2016**, April 17th 22nd 2016. Wien, A
71. M.L. Mazzucchelli, R.J. Angel, G. Rustioni, S. Milani, P. Nimis, M.C. Domeneghetti, F. Marone, J.W. Harris, F. Nestola, **M. Alvaro**. Elastic geobarometry and the role of brittle failure on pressure release. **EGU 2016**, April 17th 22nd 2016. Wien, A
72. P. Nimis, **M. Alvaro**, F. Nestola, R.J. Angel, K. Marquardt, G. Rustioni, J.W. Harris. Hydrous Silicic Fluid Films around Solid Inclusions in Gem-Quality Diamonds. **IGC 2016**, 35th International Geological Congress, 27 August - 4 September 2016, Cape Town, South Africa.
73. M. Murri, L. Scandolo, A.M. Fioretti, M.C. Domeneghetti, **M. Alvaro**. Fe-Mg exchange reaction in clinopyroxene and its application to the thermal history of planetary bodies. **Lunar and Planetary Science Conference 21st - 25th March**, Houston, Texas (USA).
74. Angel R.J., **M. Alvaro**, Gonzalez-Platas J. & Nestola F. New features in EosFit: fitting elastic moduli and phase transitions. European Mineralogical Conference – **EMC 2016**, 11th-15th September, Rimini, Italy.
75. Nimis P., **Alvaro M.**, Nestola F., Angel R.J., Marquardt K., Rustioni G. & Harris J.W. Hydrous silicic fluid films around solid inclusions in gem-quality diamonds. European Mineralogical Conference – **EMC 2016**, 11th-15th September, Rimini, Italy.
76. Nestola F., Angel R.J., Nimis P., **Alvaro M.**, Milani S., Harris J.W. The crystallographic orientations between diamond and its Mg-chromite inclusions. European Mineralogical Conference – **EMC 2016**, 11th-15th September, Rimini, Italy.
77. G. Rustioni, R.J. Angel, M.L. Mazzucchelli, S. Milani, P. Nimis, M.C. Domeneghetti, F. Marone, J.W. Harris, F. Nestola & **M. Alvaro**. Pressure release for host – inclusion systems: the interplay between brittle failure and fluid phase. European Mineralogical Conference – **EMC 2016**, 11th-15th September, Rimini, Italy.
78. **Alvaro M.**, Angel R.J., Mazzucchelli M.L., Nestola F. New constraints on PT evolution of metamorphic rocks from single inclusion piezobarometry. European Mineralogical Conference – **EMC 2016**, 11th-15th September, Rimini, Italy.
79. M. Murri, L. Scandolo, A.M. Fioretti, M.C., F. Nestola, Domeneghetti & **M. Alvaro**. new insights on Theo's flow lava using intracrystalline thermometry on augites. European Mineralogical Conference – **EMC 2016**, 11th-15th September, Rimini, Italy.

80. Mazzucchelli M.L., Burnley P., Angel R.J., Domeneghetti M.C., Nestola F., **Alvaro M.** Elastic geobarometry: uncertainties arising from the shape of the inclusion. European Mineralogical Conference – **EMC 2016**, 11th-15th September, Rimini, Italy.
81. **Alvaro M.** Solid state host-inclusion systems: a powerful tool to unravel geological and technological processes. Dept. of Chemistry, University of Frankfurt (December 2016). *Invited Seminar*.
82. **Alvaro M.** Mineral inclusions: a powerful tool for research in Earth Science. University College of London (December 2016). *Invited seminar*.
- 2017.**
83. Angel R.J., **M. Alvaro**, M.L. Mazzucchelli & Nestola F. EoSFit-Pinc: a GUI program to calculate pressures in host-inclusion systems. **EGU 2017**, April 17th 22nd 2017. Wien, A
84. Mazzucchelli M.L., Burnley P., Angel R.J., Domeneghetti M.C., Nestola F., **Alvaro M.** Elastic geobarometry: uncertainties arising from the geometry of the system. **EGU 2017**, April 17th 22nd 2017. Wien, A
85. **M. Alvaro**, Angel R.J., P. Nimis, S. Milani, J.W Harris & Nestola F. Orientation relationship between diamond and magnesiochromite inclusions. **EGU 2017**, April 17th 22nd 2017. Wien, A
86. AP Jones, **M Alvaro**, P McMillan, GD Price, J Milledge. "Lonsdaleite" signatures and shock remnants in mantle diamond? **EGU 2017**, April 17th 22nd 2017. Wien, A
87. Lucia Marinangeli, Loredana Pompilio, Anna Chiara Tangari, Antonio Baliva, **Matteo Alvaro**, Maria Chiara Domeneghetti, Franco Frau, Maria Teresa Melis, Giovanni Bonanno, Maria Consolata Rapisarda, Paolo Petrinca, Oliva Menozzi, Vasco Lasalvia, and Simone Pirrotta TOMOX : An X-rays tomographer for planetary exploration. **EGU 2017**, April 17th 22nd 2017. Wien, A
88. Angel, R.J., Mazzucchelli, M.L., Nestola, F., Alvaro, M. Elastic geobarometry: state of the art. **12th International Eclogite Conference**, August 20-29, 2017, Åre, Sweden.
89. Alvaro, M., Murri, M., Mazzucchelli, M.L., Prencipe, M., Campomenosi, M., Angel, R.J. Elastic geobarometry for UHP metamorphic rocks. **12th International Eclogite Conference**, August 20-29, 2017, Åre, Sweden.
90. Campomenosi, N., Scambelluri, M., Mihailova, B., Alvaro, M., Nestola, F., Mazzucchelli, M.L., Murri, M., Angel, R. J., Prencipe M. Experimental evidence on natural host-inclusion mineral systems to characterize the role of geometry and size of the inclusions for Raman elastic geobarometry. **12th International Eclogite Conference**, August 20-29, 2017, Åre, Sweden.
91. Murri M., Mazzucchelli M.L., Prencipe M., Mihailova B., Scambelluri M., Campomenosi N., Angel R.J., Alvaro M. Ab initio simulation on quartz (SiO₂) under hydrostatic stress vs isotropic strain. Associazione Italiana di Cristallografia **AIC2017**, 26-29 June 2017, Perugia
92. Murri M., Jones A.P., McMillan P.F., Salzmänn C.G., **Alvaro M.**, Domeneghetti M.C., Nestola F., Prencipe M., Dobson D., Hazael R., Moore M. Structure characterization of impact natural diamond from Popigai crater. **Meteoritical Society Meeting 2017**, 24-28 July 2017 Santa Fe, New Mexico, USA.
93. Lucia Marinangeli, Loredana Pompilio, Anna Chiara Tangari, Antonio Baliva, **Matteo Alvaro**, Maria Chiara Domeneghetti, Franco Frau, Vasco La Salvia, Maria Teresa Melis, oliva Menozzi, Giovanni Bonanno, Maria Consolata Rapisarda, Paolo Petrinca, Simone Pirrotta and Angela Volpe TOMOX : An X-rays tomographer for lunar planetary exploration. **European Planetary Science conference (EPSC)**, Riga.
94. **Alvaro M.**, Jones A.P., McMillan P.F., Salzmänn C.G., Murri M., Domeneghetti M.G., Nestola F., Prencipe M., Dobson D., Hazael R., Moore M., Vishnevsky S., Logvinova A.M. & Sobolev N.K. : Structure characterization of impact natural diamond from Popigai crater. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I.
95. Bonazzi M., Tumiati S., Poli S. & **Alvaro M.**: Synthesis of host-inclusion systems: Preliminary Data. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I
96. Campomenosi N., Scambelluri M., Mihailova B., **Alvaro M.**, Nestola F., Mazzucchelli M.L., Murri M., Angel R.J. & Prencipe M.: Geometry and size effects on Raman shifts in natural host-inclusion systems: an experimental validation. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I

97. Jones A.P., **Alvaro M.** & Collins G.S.: A new framework for shock transformation of terrestrial minerals in the lithosphere during bolide impacts. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I
98. Mazzucchelli M.L., Burnley P., Angel R.J., Domeneghetti M.C., Nestola F. & **Alvaro M.**: Elastic geobarometry: the strain and the stress distribution in the host-inclusion system revealed by Finite Element Modeling (FEM). **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I [714936: TRUE DEPTHS]
99. Murri M., Cámara F., Adam J., Domeneghetti M.C. & **Alvaro M.**: Intracrystalline “geothermometry” assessed on clino- orthopyroxenes bearing synthetic rocks. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I [714936: TRUE DEPTHS]
100. Zaffiro G., Angel R.J., Mazzucchelli M.L. & **Alvaro M.**: Towards a reliable equation of state for zircon. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I [714936: TRUE DEPTHS]
101. Murri M., Mazzucchelli M.L., Prencipe M., Mihailova B., Scambelluri M., Campomenosi N., Angel R.J. & **Alvaro M.**: How does quartz respond to deviatoric stresses? Ab initio calculations on SiO₂ tectosilicate. **Congresso congiunto SIMP-AIV-SoGel-SGI**. September 3rd - 6th 2017. Pisa, I [714936: TRUE DEPTHS]
102. **Alvaro M.**: An entire rock entrapped in a mineral grain: what can we learn from it? *Colloquia Doctoralia* at University of Perugia. 1st December 2017. **Invited seminar** [714936: TRUE DEPTHS]

2018.

103. Murri M., Jones A.P., McMillan P.F., Salzmann C.G., **Alvaro M.**, Domeneghetti M.C., Nestola F., Prencipe M., Dobson D., Hazael R., Moore M., Vishnevsky S., Logvinova A.M., Sobolev N.V. Crystal structure characterization of impact diamonds. International Diamond School “Diamonds: Geology, Gemology and Exploration”. 29th January-2nd February 2018, Brixen, Italy.
104. Murri M., Jones A.P., McMillan P.F., Salzmann C.G., **Alvaro M.**, Domeneghetti M.C., Nestola F., Prencipe M., Dobson D., Hazael R., Moore M., Vishnevsky S., Logvinova A.M., Sobolev N.V. XRD structure characterization of impact diamonds from Popigai crater. **XIV National Congress of Planetary Sciences** 5th-9th February 2018, Bormio, Italy.
105. Morana M., Murri M., Nestola F., Fioretti A.M., **Alvaro M.**, Domeneghetti M.C., Goodrich C., Shaddad M.H. Diamonds in the Almahata Sitta meteorite. **XIV National Congress of Planetary Sciences** 5th-9th February 2018, Bormio, Italy.
106. Angel R.J., Murri M., Mazzucchelli M.L., Prencipe M., Mihailova B., **Alvaro M.** Using Raman scattering to measure strains in crystals under non-hydrostatic stress conditions. 26th Annual Meeting of the German Crystallographic Society: **DGK2018** 5th-8th March 2018, Essen, Germany.
107. **Alvaro M.** News and views on inclusion barometry. Pierre et Marie Curie University, Paris. March 19th 2018. **Invited seminar** [714936: TRUE DEPTHS]
108. Gabriele Zaffiro, Ross John Angel, **Matteo Alvaro**, Mauro Prencipe, and Claudia Stangarone: P-V-T-K^S Equations of State for zircon and rutile. **EGU 2018**, Wien, A. [714936: TRUE DEPTHS]
109. Nicola Campomenosi, Mattia Luca Mazzucchelli, Boriana Mihailova, Marco Scambelluri, Ross John Angel, and **Matteo Alvaro**: Elastic geobarometry: a comparison between experiments and numerical simulations. **EGU 2018**, Wien, A. [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
110. Ross Angel and **Matteo Alvaro**: What Are Mineral Inclusions Really Telling Us about High-pressure Rocks? **EGU 2018**, Wien, A. [714936: TRUE DEPTHS]
111. **Alvaro M.** News and views on inclusion barometry and the possible role of overpressure. University of Milano Bicocca, Milano, Italy. May 3rd 2018. **Invited seminar** [714936: TRUE DEPTHS]
112. Németh, P., Tóth, S., Koós, M., Jones, A.P., McMillan, P.F., Miller, T., McGilvery, C., Salzmann, C.G., **Alvaro, M.**, Murri, M., Nestola, F., and Garvie, L.A.J. (Year) of Conference Peculiar graphite-diamond grains in the impact-produced Popigai sample. **Annual meeting of the Hungarian Society for Microscopy**, May 24th-26th 2018. Siófok - Lake Balaton, Hungary

113. Campomenosi N., Mazzucchelli M.L., Mihailova B., Scambelluri M., Stangarone C., Angel R.J., **Alvaro M.**: Raman spectroscopy as a tool to determine elastic strain in natural host-inclusion systems. **GeoRaman 2018**, Catania, I [714936: TRUE DEPTHS]
114. Mara Murri, Mauro Prencipe, Ross J. Angel, Borianna Mihailova and **Matteo Alvaro**: The role of the phonon Grüneisen tensor in the application of Raman spectroscopy for geobarometry. **GeoRaman 2018**, Catania, I
115. C. Stangarone, M. Prencipe, R. Angel, B. Mihailova, **M. Alvaro**: New insights into zircon-reidite phase transition: an ab initio study. **GeoRaman 2018**, Catania, I [R164WEJAHH: IMPACT, 714936: TRUE DEPTHS]
116. Mazzucchelli M.L., Angel R.J., Nestola F., **Alvaro M.**: Pressure estimates from fluid and solid inclusions in minerals. EGU - Galileo Conference, Liebnitz, A (24th 29th June 2018) [714936: TRUE DEPTHS]
117. Murri, M., Cámara, F., Adam, J., Domeneghetti, M.C., and **Alvaro, M.** (2018) Intracrystalline geothermometers validated on synthetic clino and orthopyroxenes and applied to a terrestrial analogue. **EPSC 2018** - European Planetary Congress, Berlin. [R164WEJAHH: IMPACT]
118. **Alvaro M**, Campomenosi N, Mazzucchelli ML, Mihailova BD, Scambelluri M & Angel RJ: Geothermobarometry of Inclusions from Raman Spectroscopy: Advantages and Limitations. **Goldschmidt Abstracts**, 2018, Boston, USA [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
119. **Alvaro M. (2018)** “Elastic Geothermobarometry for host inclusion systems theory and practice” Invited Seminar at E-Fire annual Workshop. Boston, USA *Invited seminar* [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
120. Morana M., Murri M., Nestola F., Fioretti A.M., **Alvaro M.**, Domeneghetti M.C., Goodrich C., Shaddad M.H. X-ray diffraction study of diamonds from the Almahata Sitta meteorite. **XLVII Annual Meeting of the AIC**, 25th-28th June 2017, Roma, Italy.
121. **Alvaro M.** Using Crystal physics to unravel geological puzzles (Premio Nardelli talk) **XLVII Annual Meeting of the AIC**, 25th-28th June 2017, Roma, Italy.
122. Campomenosi N., Mazzucchelli M.L., Mihailova B.D., Korsakov A.V., Scambelluri M., Angel R.J. & **Alvaro M.**: Relations between induced birefringence haloes and polarized raman spectra in host cubic crystals. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
123. Gilio M., Campomenosi N., Scambelluri M. & **Alvaro M.**: Raman vs. classic geothermobarometry: a comparative study. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
124. Mazzucchelli M.L., Angel R.J., Morganti S., Reali A. & **Alvaro M.**: Elastic geobarometry for elastically anisotropic inclusions. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
125. Murri M., Mazzucchelli M.L., Campomenosi N., Korsakov A.V., Prencipe M., Mihailova B.D., Scambelluri M., Ange R.J. & **Alvaro M.**: Raman elastic geobarometry for anisotropic mineral inclusions. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
126. Van Schroyen Lantman H.W., Wallis D., Scambelluri M. & **Alvaro M.**: Applying elastic geobarometry on the Lago di Cignana UHPM unit: preliminary results. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
127. Bonazzi M., Tumiati S., Thomas J. & **Alvaro M.**: Raman approach to evaluate the strain state of synthetic host-inclusion pair. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
128. Piazza M., Morana M. & **Alvaro M.**: Fingerprinting diamonds growth conditions through the time and temperature dependence of the properties of magnetic inclusions. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]

129. Zaffiro G., Angel R.J., Prencipe M., Stangarone C. & **Alvaro M.**: A novel approach to determine accurate Equations of State for zircon and rutile. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
130. Angel R.J., **Alvaro M.** & Nestola F.: Beyond routine refinements in a routine way. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
131. Marinangeli L., Pompilio L., Baliva A., **Alvaro M.**, Bonanno G., Domeneghetti M.C., Frau F., La Salvia V., Melis M.T., Menozzi O., Tangari A.C., Rapisarda M., Petrinca P. & Pirrotta S. : An X-Rays tomographer (Tomox) for in situ planetary exploration. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [R164WEJAHH: IMPACT, RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
132. Morana M., Murri M., Nestola F., Barbaro A., Fioretti A.M., **Alvaro M.**, Domeneghetti M.C., Goodrich C. & Shaddad M.H. : Diamond formation in ureilites: a shock origin inferred from diamond in Almahata Sitta ureilites. **Congresso congiunto SIMP-SGI**. September 12th – 14th 2018. Catania, I [R164WEJAHH: IMPACT, RBSI140351: MILE DEEp, 714936: TRUE DEPTHS]
133. Alvaro M. Mineral inclusion – host systems as natural high-pressure cells. Universidad La Laguna, Tenerife, Spain. October 9th - 12th 2018. *Invited seminar* [714936: TRUE DEPTHS]

2019.

134. Piazzì, M., Morana, M., Coïsson, M., Ferrara, E., Basso, V., Jones, A.P., and **Alvaro, M.** Experimental study and physical interpretation of hysteresis of magnetic inclusions in Earth diamonds. **Magnet** 19, 2019/1/31. Messina, Italy [R164WEJAHH: IMPACT]
135. Barbaro, A., Domeneghetti, M.C., Meneghetti, M., Litti, L., Fioretti, A.M., Goodrich, C., Shaddad, M.H., **Alvaro, M.**, and Nestola, F. Graphite-based geothermometry of Almahata Sitta meteorite. **XV National Congress of Planetary Sciences**, 2019/2/04-08. Florence [R164WEJAHH: IMPACT]
136. Murri, M., Cámara, F., Adam, J., Domeneghetti, M.C., and **Alvaro, M.** Intracrystalline geothermometry applied to a Martian analogue. **XV National Congress of Planetary Sciences**, 2019/2/04-08. Firenze, Italy. [R164WEJAHH: IMPACT]
137. Stangarone, C., Angel, R.J., Prencipe, M., Mihailova, B.D., and **Alvaro, M.** New insights into the zircon-reidite phase transition as an indicator of impact structures. **LPSC 2019** - Lunar and Planetary Science Conference, 2019/4/18-22. Huston, TX, USA [R164WEJAHH: IMPACT, 714936: TRUE DEPTHS]
138. Mihailova, B., Stangarone, C., Waesermann, N., Angel, R.J., Prencipe, M., and **Alvaro, M.** A new high-pressure polymorph of ZrSiO₄ revealed by DFT modelling and Raman spectroscopy. **DGK**, 2019/3/25-28. Leipzig, Germany [714936: TRUE DEPTHS]
139. Angel, R.J., Zaffiro, G., Stangarone, C., Mihailova, B., Murri, M., and **Alvaro, M.** The Limitations on Quasi-harmonic Thermal-Pressure Equations of State from Anisotropic Thermal Pressure. **DGK**, 2019/3/25-28. Leipzig, Germany [714936: TRUE DEPTHS]
140. **Alvaro, M.**, Gilio, M., Angel, R., and Scambelluri, M. Elastic geothermobarometry on multiple inclusions in a single host. **EGU General Assembly 2019**, 2019/4/8-12. Vienna, A [714936: TRUE DEPTHS]
141. Angel, R., Zaffiro, G., Stangarone, C., Mihailova, B., Murri, M., and **Alvaro, M.** The Limitations on Quasi-harmonic Thermal-Pressure Equations of State from Anisotropic Thermal Pressure. **EGU General Assembly 2019**, 2019/4/08-12. Vienna, A [714936: TRUE DEPTHS]
142. Lantman, H.v.S., Wallis, D., Scambelluri, M., and Alvaro, M. Garnetite formation along fluid pathways in subducting oceanic sediments from Lago di Cignana, Western Alps. **EGU General Assembly 2019**, 2019/04/8-12. Vienna, A [714936: TRUE DEPTHS]
143. Campomenosi, N., Mazzucchelli, M.L., Mihailova, B.D., Angel, R.J., Scambelluri, M., and **Alvaro, M.** Analysis of induced birefringence in host-inclusion mineral systems: a Raman spectroscopy approach. **EGU General Assembly 2019**, 2019/04/8-12. Vienna, A [714936: TRUE DEPTHS]

144. **Alvaro M.** News and views on host-inclusion elastic geothermobarometry. June 2019 University of Potsdam, Germany. *Invited lecture*. [714936: TRUE DEPTHS]
145. Musiyachenko K.A, Murri M., Prencipe M., **Alvaro M.** The complexity behind the simple Ti oxide structure: Can rutile be used as an elastic geobarometer? **XIX International meeting on crystal chemistry, x-ray diffraction and spectroscopy of minerals** 2019, 2nd – 5th July 2019, Apatity, Russia
146. **Alvaro M.**, Angel R.J., Mazzucchelli M.L., Campomenosi N., Murri M., Scambelluri M. The absence of deviatoric stresses in diamond-grade eclogites. **IUGG International Union for Geodesy and Geophysics General Assembly 2019**, 2019/7/7-18. Montreal, Canada [714936: TRUE DEPTHS]. *Invited keynote*.
147. Gu, Tingting, Pamato, Martha G., Novella, Davide, Nestola, Fabrizio, **Alvaro, Matteo**, Fournelle, John H. And Wang, Wuyi. Fragments sampled at earth's transition zone and lower mantle boundary by a type iab diamond **GSA Annual Meeting 2019**, Phoenix, Arizona, USA – 2019/9/22-25.
148. **Ross Vienna**
149. Morana M., Murri M., Girani A., Angel R.J., **Alvaro M.** Ab initio simulation and X-ray diffraction measurements of deviatoric stress in mineral inclusions. 32st European Crystallographic Meeting, **ECM32 2019**, 18th- 23rd August 2019, Wien, Austria.
150. **Alvaro M.**, Mazzucchelli M. L., Angel R. J., Murri M., Campomenosi N., Scambelluri M., Nestola F., Korsakov A.V., Tomilenko A., Marone F., Morana M. Preserved quartz inclusions from eclogite xenoliths record past subduction in Siberian craton. **Goldschmidt Conference 2019**, 18th- 23rd August 2019, Barcelona, Spain. Mara
151. Mazzucchelli M.L., Angel R.J., Morganti S., Murri M., Campomenosi N., Scambelluri M., Marone F., Korsakov A.V., Morana M., **Alvaro M.** Quartz inclusions from eclogite xenoliths record past subduction. Goldschmidt Conference 2019, Barcelona Spain.
152. Vetere F., Murri M., **Alvaro M.**, Domeneghetti M.C., Rossi S., Pisello A., Perugini D., Holtz F. Viscosity of pyroxenite melt and its evolution during cooling. Goldschmidt Conference 2019, 18th- 23rd August 2019, Barcelona, Spain.
153. Murri M., Korsakov A.V., Angel R.J., Prencipe M., Mihailova B. D., **Alvaro M.** Raman elastic geobarometry to infer unique P-T conditions of host-inclusion systems from UHPM rocks. Goldschmidt Conference 2019, 18th- 23rd August 2019, Barcelona, Spain.
154. Nestola F., Barbaro A., Morana M., Christ O., Brenker F.E., Domeneghetti M.C., Dalconi M.C., **Alvaro M.**, Goodrich C., Fioretti A.M., Leoni M., Shaddad M.H., Origin of diamond in ureilites. Goldschmidt conference 2019, 18th -24th August 2019, Barcelona (Spain).
155. Bonazzi M., Tumiaty S., Thomas J., Angel R.J., **Alvaro M.**, assessing the reliability of elastic geobarometry methods. Goldschmidt conference 2019, 18th -24th August 2019, Barcelona (Spain)
156. Gilio M, **Alvaro M** & Scambelluri M (2019) Elastic Geothermobarometry on Multiple Inclusions in a Single Host. Goldschmidt conference 2019, 18th -24th August 2019, Barcelona (Spain)
157. Hermann J., Reichenwallner S., Pettke T., Schlunegger F., Berger A., Murri M., **Alvaro M.** Raider of the lost (island) arc: Reconstruction of volcanic activity at the transition from subduction to collision based on detrital amphibole and pyroxene from the Taveyannaz sandstone. **The 14th Alpine Workshop** Emile Argand Conference on Alpine Geological Studies 2019, 2nd – 8th September 2019, Sion, Switzerland.
158. Campomenosi N., Scambelluri M., Angel R. J., Hermann J., Rubatto D., Mihailova B., **Alvaro M.** Elastic barometry on zircon inclusions in garnet megablasts from the Dora Maira Massif (Western Alps). 14th Emile Argand Conference on Alpine Geological Studies 2019. 2019/7/2-8. Sion, Switzerland.
159. Van Schroyen Lantman H.W., Wallis D., Scambelluri M., **Alvaro M.** High volumes of mineral dissolution by localized fluid pulses in UHPM metasediments of Lago di Cignana, Western Alps. 14th Emile Argand Conference on Alpine Geological Studies 2019, 2019/09/4-6. Sion, Switzerland

160. Morana M., Murri M., Girani A., Angel R.J., **Alvaro M.** Computational and experimental characterization of deviatoric stress in mineral inclusions. Fifth Meeting of the Italian (**AIC**) and Spanish Crystallographic (GE3C) Associations (MISCA V) 2019, 4th -7th September 2019, Napoli, Italy.
161. Murri M., Stangarone C., Korsakov A.V., Angel R.J., Prencipe M., Mihailova B.D., **Alvaro M.** How to determine a unique entrapment condition of host-inclusion systems from UHPM rocks using Raman elastic geobarometry. **9th European Conference on Mineralogy and Spectroscopy** 2019, 10th – 13th September 2019, Prague, Czech Republic.
162. Musiyachenko K. A., Murri M., Prencipe M., **Alvaro M.** The complexity behind the simple Ti oxide structure. 9th European Conference on Mineralogy and Spectroscopy 2019, 10th – 13th September 2019, Prague, Czech Republic.
163. Campomenosi N., Mazzucchelli M. L., Mihailova B., Angel R.J., **Alvaro M.** Using polarized Raman spectroscopy to detect strain gradient in optical anomalous host-inclusion mineral systems. 9th European Conference on Mineralogy and Spectroscopy 2019. 2019/9/11-13. Prague, Czech Republic.
164. Morana M., Murri M., Girani A., Angel R.J., **Alvaro M.** Characterizing deviatoric stress in mineral inclusions. Joint Congress SIMP-SGI-SOGEI 2019, 16th- 19th September 2019, Parma, Italy.
165. Vetere F., Pisello A., Murri M., **Alvaro M.**, Rossi S., Holtz F., Perugini D. Viscosity of ultramafic melts during cooling: insights for emplacement of Martian lava flows. Joint Congress **SIMP-SGI-SOGEI 2019**, 16th- 19th September 2019, Parma, Italy.
166. Nazzareni S., Pauselli C., Skogby H., Murri M., Domeneghetti M.C., **Alvaro M.**, Stalder R., Petrelli M., De Sanctis M.C., Formisano M., Federico C. Pyroxenes as a proxy for thermal history and water content of asteroid 4 Vesta. Joint Congress SIMP-SGI-SOGEI 2019, 16th- 19th September 2019, Parma, Italy.
167. Musiyachenko K. A., Murri M., Prencipe M., **Alvaro M.** Rutile in diamond: the role of elastic anisotropy. Joint Congress SIMP-SGI-SOGEI 2019, 16th- 19th September 2019, Parma, Italy.
168. Angel R.J., Murri M., Prencipe M., Stangarone C., Mihailova B.D., **Alvaro M.** Measuring strains with Raman Spectroscopy. Joint Congress SIMP-SGI-SOGEI 2019, 16th- 19th September 2019, Parma, Italy.
169. Nestola F., Barbaro A., Morana M., Christ O., Brenker F.E., Domeneghetti M.C., Dalconi M.C., **Alvaro M.**, Goodrich C., Fioretti A.M., Leoni M., Shaddad M.H., Diamond in ureilites: how did they form?. Joint congress SIMP-SGI-SOGEI 2019, 16th -19th September 2019, Parma (Italy). Alpine Conference Nicola
170. Van Schrojenstein Lantman H.W., Langone A., Scambelluri M., **Alvaro M.** Uncovering UHPM garnet growth and dissolution mechanisms using trace elements in metasediments from Lago di Cignana, Western Alps. National SIMP-SGI-SOGEI Conference 2019, 2019/09/16-19. Parma, Italy
171. Tingting Gu, Martha G Pamato, Davide Novella, Fabrizio Nestola, **Matteo Alvaro**, John H Fournelle, Wuyi Wang, fragments sampled at earth's transition zone and lower mantle boundary by a type Iab diamond. GSA Annual Meeting 2019/9/25. Phoenix, Arizona, USA
172. Malaspina N., Campione M., La Fortezza M., **Alvaro M.**, Scambelluri M. Epitactic mineral growth in fluid inclusions monitors redox equilibria in subducting ultramafic rocks. **AGU Fall Meeting 2019**, 2019/12/9-13. San Francisco, USA.
173. Van Schrojenstein Lantman H.W., Wallis D., Scambelluri M., **Alvaro M.** High volumes of mineral dissolution by localized fluid pulses in UHPM metasediments of Lago di Cignana, Western Alps. AGU Fall Meeting 2019, 2019/12/9-13. San Francisco, USA.

2020.

174. Adrian Jones(UCL), Paul Guyett (TCD), Andy Beard (BBK), Simon Drake (UCL), Mara Murri (UPavia), Matteo Alvaro (UPavia) Quantitative characterisation of micro- to nanoscale hypervelocity shock damage in natural materials. **Microscopy Society of Ireland annual conference 2020** [R164WEJAHH: IMPACT]
175. Matteo Alvaro, Mattia L. Mazzucchelli, Ross J. Angel, Mara Murri, Nicola Campomenosi, Marco Scambelluri, Fabrizio Nestola, Andrey Korsakov, Anatoly Tomilenko, Federica Marone, Marta Morana, and Federico

Alabarse Fossil Subduction Recorded By Quartz From The Coesite Stability Field. **EGU General Assembly 2020**, 2020/05/4-8. Vienna, A [714936: TRUE DEPTHS]

176. Hugo van Schrojenstein Lantman, David Wallis, Marco Scambelluri, and Matteo Alvaro High volumes of mineral dissolution by localized fluid pulses in UHPM metasediments of Lago di Cignana, Western Alps. **EGU General Assembly 2020**, 2020/05/4-8. Vienna, A [714936: TRUE DEPTHS]
177. Kira Musiyachenko, Mara Murri, Ross John Angel, Mauro Prencipe, Matteo Alvaro, and Hugo van Schrojenstein Lantman Elastic geobarometry of multiphase inclusions. **EGU General Assembly 2020**, 2020/05/4-8. Vienna, A [714936: TRUE DEPTHS]
178. Ross Angel, Mara Murri, Nicola Campomenosi, Borianna Mihailova, Mauro Prencipe, and Matteo Alvaro Measuring stress and strain in rocks by spectroscopy. **EGU General Assembly 2020**, 2020/05/4-8. Vienna, A [714936: TRUE DEPTHS]
179. Mattia Gilio, Matteo Alvaro, Ross Angel, and Marco Scambelluri Elastic geothermobarometry on multiple inclusions in a single host. **EGU General Assembly 2020**, 2020/05/4-8. Vienna, A [714936: TRUE DEPTHS]
180. Mara Murri, Chiara Maria Domeneghetti, Anna Maria Fioretti, Fabrizio Nestola, Francesco Vetere, Diego Perugini, Alessandro Pisello, Manuele Faccenda, and Matteo Alvaro Thermal history and emplacement mechanisms of Theo's Flow lava: a proxy for Martian lava flows. **EGU General Assembly 2020**, 2020/05/4-8. Vienna, A [714936: TRUE DEPTHS]
181. Nazzareni S, Pauselli C, Skogny H, Murri M, Domeneghetti MC, Alvaro M, Stalder R, Petrelli M, De Sanctis MC, Formisano M & Federico C (2020) A Dry Origin of 4-Vesta Estimated by the Water Content in Pyroxenes from the HED. *Goldschmidt Abstracts*, 2020
182. Alvaro M, Angel R & Mazzucchelli M (2020) Truth or Dare on Mineral Inclusions, **Goldschmidt Abstracts**, 2020 (**Invited talk**)
183. Alix M. Ehlers, Gabriele Zaffiro, Ross J. Angel, Tiziana Boffa-Ballaran, Michael A. Carpenter, **Matteo Alvaro**, Nancy L. Ross (2020) Thermoelastic Properties of Zircon, *GSA Abstract* #354599.

2021.

184. Alvaro M. Mineral inclusions trapped in mineral hosts: A natural "high pressure" experiment. **Invited talk BGI seminars**
185. Bruna B. Carvalho, Omar Bartoli, Satish Kumar, Tetsuo Kawakami, Tomokazu Hokada, Mattia Giglio, Matteo Alvaro, Bernardo Cesare (2021) Generation of silicic magmas at ultra-high temperature conditions: evidence from a melt inclusion investigation. **EGU General Assembly 2021**
186. Mattia Gilio, Nicola Campomenosi, Kira Musiyachenko, Ross J. Angel, Bernardo Cesare and Matteo Alvaro (2021) Elastic geobarometry of quartz inclusions in garnet at high temperature. **EGU General Assembly 2021**
187. C.J. Barnes, J. Majka, D. Schneider, M. Gilio, M. Bukala M. Alvaro (2021) The subduction, exhumation, and deformation history of the Vaimok Lens, Seve Nappe Complex, Scandinavian Caledonides. **EGU General Assembly 2021**
188. Rick Verberne et al (2021) Trace-element migration during crystal-plastic deformation in UHP rutile: dislocations in low-angle boundaries as high-diffusivity pathways. **EGU General Assembly 2021**
189. Hugo W. van Schrojenstein Lantman, David Wallis, Mattia Gilio, Marco Scambelluri, Matteo Alvaro. Elastic strains of quartz inclusions and microstructures from pressure solution in garnet reveal orientation and low magnitude of differential stress during subduction metamorphism. **EGU General Assembly 2021**
190. Martha G. Pamato, Davide Novella, Dorrit E. Jacob, Beñat Oliveira, D. Graham Pearson, Stephanie Greene, Juan Carlos Afonso, Marco Favero, Thomas Stachel, Matteo Alvaro and Fabrizio Nestola (2021) Sulphide inclusions and the age of diamond formation: Does protogeneity matter? **Goldschmidt Lyon 2021**
191. Sofia Lorenzon, Fabrizio Nestola, Martha G. Pamato, Davide Novella, Paolo Nimis, Federica Marone, Chiara Anzolini, Mattia L. Mazzucchelli, Matteo Alvaro, Margo Regier, Thomas Stachel, D. Graham Pearson, Jeffrey W.

Harris. Genesis and Depth of Formation of Ferropericlasite Inclusions within Super-Deep Diamonds (2021)
Goldschmidt Lyon 2021

192. Nadia Malaspina, Marcello Campione, Matteo Alvaro, Mattia La Fortezza, Simone Tumiatì and Marco Scambelluri (2021) mineral nucleation controls the thermodynamic equilibria in multiphase inclusions.
Goldschmidt Lyon 2021

193. Alvaro M. (2021) Crystalline host-inclusion systems: a natural “high pressure” experiment. Institute of Crystallography RWTH Aachen University. *Invited Seminar*

194. Barbaro A, Domeneghetti MC, Litasov KD, Ferriere L, Pittarello L, Christ O, Lorenzon S, Alvaro M, Nestola F (2021) Carletonmooreite (Ni₃Si) in shocked diamond-bearing kenna ureilite. **84th Annual Meeting of The Meteoritical Society 2021** (online)

195. Ross Angel, Mattia Gilio, Matteo Alvaro (2021) Heat Capacity as a Constraint on Equation of State Parameters: Application to Garnets. **3rd European Mineralogical Conference** (online)

196. Mara Murri, Joseph P. Gonzalez, Mattia L. Mazzucchelli, Mauro Prencipe, Boriana Mihailova, Ross J. Angel, Matteo Alvaro (2021) The role of symmetry breaking strains in anisotropic host-inclusion systems: an ab initio study on alpha quartz. **3rd European Mineralogical Conference** (online)

197. Kayleigh M M Harvey, Paul G Starr, Mattia Gilio, Matteo Alvaro, Michael J Jercinovic, Marco Scambelluri and Ethan Baxter (2021) What’s my age again? New constraints from zoned Sm-Nd garnet geochronology on the subduction history of UHP Dora-Maira whiteschists, Italy. **AGU Fall meeting 2021**.

2022.

198. Long-term rheology , heat budget and dynamic permeability of deforming and reacting rocks: from laboratory to geological scales (Hugo van Schrojenstein Lantman et al.) **EGU General Assembly 2022**

199. Evolution of the Earth's upper mantle: a petrological, geochemical and geodynamic perspective on lithospheric mantle xenoliths, orogenic and ophiolitic peridotites (Yuuki Hagiwara et al.) **EGU General Assembly 2022**

200. Elastic thermobarometry on Zircon-in-Garnet (ZiG) from the Brossasco-Isasca unit (Dora-Maira Massif, Western Alps) (Giulia Mingardi et al.) **EGU General Assembly 2022**

201. Coupled elastic and intracrystalline geothermobarometers to constrain PT conditions of lower arc crust granulites M Gilio, B Cesare, O Gianola, F Ferri, M Murri, A Barbaro, M Alvaro. **EGU General Assembly Conference Abstracts, EGU22-9342**

202. Garnet Equations of State: a critical review and synthesis R Angel, M Gilio, M Mazzucchelli, M Alvaro **EGU General Assembly Conference Abstracts, EGU22-4283**

203. Fast resetting of zircon in garnet inclusion pressures: implications for elastic geothermobarometry. N Campomenosi, B Mihailova, RJ Angel, M Scambelluri, M Alvaro. **EGU General Assembly Conference Abstracts, EGU22-1247**

204. Tamás Spránitz, José Alberto Padrón-Navarta, Csaba Szabó, Mattia Gilio, Matteo Alvaro, Abel Szabó, Márta Berkesi. Evolution of fluids from a subduction zone: unraveling PT and compositional evolution path based on complex inclusion study. **Goldschmidt conference 2022**

205. Joseph Patrick Gonzalez, Jay B Thomas, Mattia Luca Mazzucchelli, Ross J Angel, Matteo Alvaro Experimental evaluation of anisotropic elastic thermobarometry applied to stiff mineral inclusions in soft hosts: First evaluation of zircon inclusions in quartz. **Goldschmidt conference 2022**

206. A Barbaro, MC Domeneghetti, AM Fioretti, M Alvaro, F Nestola. Carbon Polymorphs in Frontier Mountain Ureilitic Meteorites: A Correlation with the Increasing Degree of Shock? **LPI Contributions 2695, 6212**

2023.

207. M Gilio, M Morana, R Angel, B Mihailova, M Alvaro. Does the polymorphic transition in quartz trigger lower crustal earthquakes? **EGU General Assembly 2023**

208. N Campomenosi, RJ Angel, M Alvaro, B Mihailova. Rheology of host-inclusion mineral systems by in situ Raman spectroscopy. **EGU General Assembly 2023**

209.

• **DIVULGATIVE ACTIVITIES:** Only main activities are listed

1. **Alvaro M.** (2009) Pigeonite under non-ambient conditions. *Scientifica Acta*, 3, 17-22.
2. **Alvaro M.** (2010) Pigeonite under non-ambient conditions. *Plinius* 37 (SIMP Ph.D. thesis).
3. Nimis, P., Angel, R.J., **Alvaro, M.**, Nestola, F. (2016) From mineralogy to petrology: The example of diamond and its inclusions. *Rendiconti Online Societa Geologica Italiana*, 37, 47-49.
4. "The true depths of subduction", *Il Sole 24Ore*, Platinum (2016) (article about M. Alvaro)
5. "Un team di esperti analizza la crosta terrestre delle Alpi". ERC Newsletter Unipv. (article about M. Alvaro)
6. European Researchers Night 2019 @Unipv
7. Series of research and teaching videos for University of Pavia
8. Chairperson for "Destination UK after Brexit" conference at University of Pavia
9. What happens below Earth's surface when the most powerful earthquakes occur (Horizon2020 Magazine article about M. Alvaro)

• **RESEARCH INTERESTS AND TRACK RECORD:**

The overall goal of my research is the determination of the chemical, physical and mechanical properties of minerals that represent the deep regions of the Earth because these properties govern planet-scale geological processes such as convection, plate tectonics and subduction. In detail, my research activity is focused on the in-situ determination of the thermo-elastic properties of minerals by means of X-ray diffraction (XRD) techniques applied under extreme conditions of pressure and temperature. Furthermore, I have dedicated a large part of my research to shed light on geological processes occurring on planetary bodies by investigating minerals from meteorites.

Since the start of my bachelor and masters degrees at the University of Pavia I have focused all of my efforts on the investigation of crystal-chemical properties (*i.e.* cation substitution and order-disorder phenomena) of mineral phases relevant for the Earth and planetary sciences (*e.g.* publication number 19). During my Ph.D. I directed my interests towards the investigation of the elastic properties of mantle minerals under extreme conditions of temperature and pressure. My PhD project was entirely devoted to the application and development of high-pressure and high-temperature (*in situ* and *ex situ*) methods mostly in combination with single-crystal X-ray diffraction (SC-XRD). That research (3 years) allowed me to author several papers (*e.g.* 2,5,7) focused on the high-pressure and high-temperature phase transformations of pyroxenes with compositions typical of the Earth's upper mantle and of a class of meteorites called ureilites. The aim of this work was to (i) understand the effects of common chemical substitutions on mineral elastic behavior (*i.e.* phase transitions at high temperatures and pressures as possible cause for seismic discontinuities) and (ii) determine the equilibrium exchange reaction on the same phases to understand and interpret host meteorites cooling history.

After completion of my PhD in 2010, I obtained a position as a post-doctoral fellow (funded by NSF grant EAR 0738692 to N.L. Ross and R.J. Angel) at Virginia Polytechnic Institute and State University in Blacksburg (Virginia, USA). My research at Virginia Tech was focused on the high-pressure and low-temperature behavior of hydrous mantle minerals with framework structures (*i.e.* zoisite, kalsilite, epidote etc.) relevant for subduction processes in the Earth. The papers published during the period at Virginia Tech (*e.g.* 11,13) show the relevance of accuracy and precision in the determination of the elastic properties of mineral phases.

Immediately after the post-doc at Virginia Tech I moved back to Italy to collaborate as a team member to the MARS-XRD project (P.I. Lucia Marinangeli) for EXO-MARS mission (2018 ESA) developing calibrations of exchange reaction equilibria for pyroxenes contained in meteorites and their terrestrial analogues. This research allowed me to publish

some papers (e.g. 18, 14,12) and develop many new ideas for research to be carried out in the field of planetary science (e.g. 20).

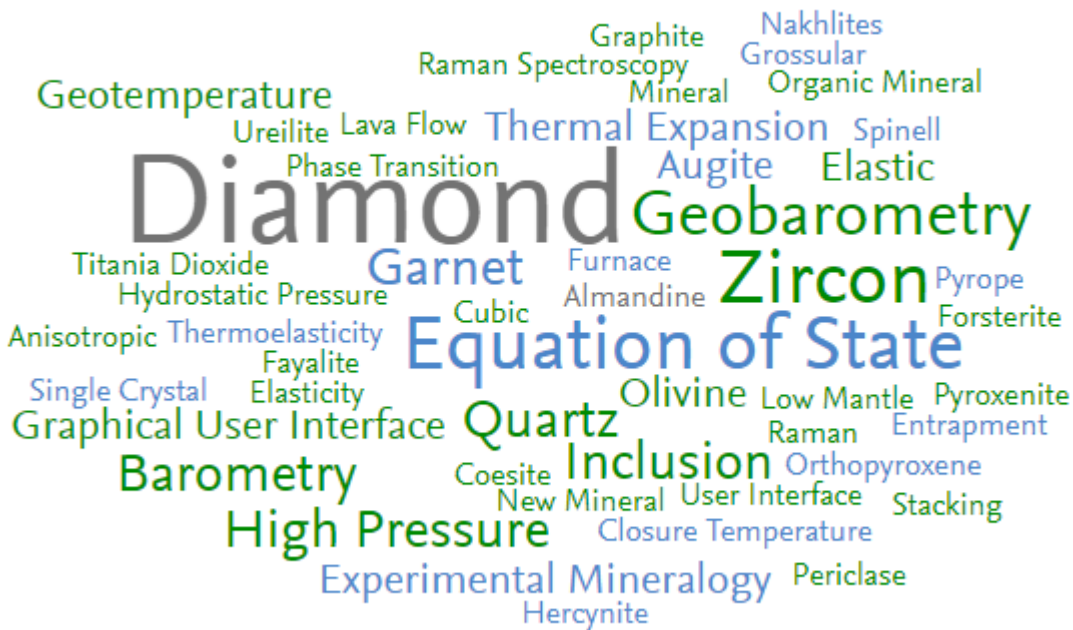
The experience gained during my PhD and two post-doctoral positions (in United States and Italy) allowed me to obtain a position as a post-doctoral research fellow at University of Padua funded by the European Research Council (ERC grant #307322, acronym **INDIMEDEA**, PI F. Nestola). The INDIMEDEA project was devoted to determining the processes and depth of formation of cratonic diamonds using the information retrieved from the orientation and elastic behavior of mineral phases trapped in natural diamonds as inclusions.

The first two years of work within the framework of the INDIMEDEA project allowed me to start revisiting general elasticity theory (e.g. see publications 1,3,6,8,10,15) to prepare the ground for re-writing a newly developed elasticity formalism. Development of these ideas allowed me to obtain some funds from the Italian Ministry of Research and University for a project named **MILE DEEP** (project code: RBSI140351). This funding allowed me to recruit 4 PhD students to expand my research group and to start developing the mineral physics laboratory at the University of Pavia. The project is mainly aimed to develop the isotropic elastic method and perform the first in situ measurements on isotropic host-inclusion pairs. Early development of the MILE DEEP project revealed that in order to generalize the method and extend it to any type of rock, further development beyond the case of simple non-linear elastic isotropy was necessary. Furthermore, testing the general results is also mandatory. Therefore, I developed a complementary project "**TRUE DEPTHS**" (project code: 714936), funded by the European Research Council (ERC) in the framework of the ERC starting grant call in 2016, aimed to further generalize elasticity theory by incorporating anisotropic elasticity and geometrical effects. The main goal of the ERC-funded project is to explore the use of elastic anisotropy of hosts and their inclusions to provide a quantitative estimate of the stresses acting on the host inclusion pair and obtain a quantitative estimate of both the full stress field and T for an entire outcrop that can be then linked with time. This will enable the first quantitative stress-depth-time evaluation to be performed extensively across some of the most crucial ultra-deep subduction zones in Europe. The interest for the effect of oriented stresses on common minerals led me to develop another research project "**IMPACT**" (project code: R164WEJAHH) funded by the Italian Ministry for Research and University (MIUR) to investigate the effect of uniaxial compression on planetary materials and applied to extraterrestrial micro-diamonds. Together with these research projects I continue to pursue collaborative research with several other research groups worldwide on several other topics including natural terrestrial and extraterrestrial natural materials (e.g. PRIN - Dynastar research project, NSF - QUIZ, INAF – OI bodies etc...)

The entire development of my research is supported by experimental and theoretical interests that includes the following main topics:

- High pressure study of crystalline material by means of single-crystal X-ray diffraction using DAC (Diamond Anvil Cell) apparatus mounted on point detector and area detector diffractometers (i.e. Rigaku, Bruker and Huber systems). In particular, these experiments have a wide variety of applications from the elastic response of mineral from the Earth's mantle (e.g. publications 2, 4, 9, 11 etc..) to industrial/commercial development and applications (i.e. ceramic industry, gemstone industry etc... see publications 6, 8, 10, 17 etc..).
- High temperature study of crystalline material *in situ* by single-crystal X-ray diffraction using micro-furnace mounted on conventional diffractometer (i.e. Philips, Huber, Bruker and Rigaku systems). These experiments have a wide variety of applications ranging from the elastic response of minerals from the Earth's mantle (e.g. publication 3, 21), the spectral analysis of planetary bodies (e.g. publication 15) to industrial/commercial development and application (i.e. ceramic industry, gemstone industry etc...see publications 3, 14, 16). To this aim I developed a new high-temperature device (publication 29) with considerably improved performances with respect to its predecessors. It allows determining lattice thermal expansion on single-crystals by means of X-ray diffraction up to 1200K with much higher precision and accuracy than before, using the same methods adopted for high-pressure measurements (e.g. 8-position centring).

- Kinetic and equilibrium study of crystalline material at high temperature conditions *ex situ* by single-crystal X-ray diffraction (i.e. Rigaku and Bruker area detector systems) using ovens for the annealing experiments. These experiments are relevant to study Earth and planetary processes such as cooling rate and history of terrestrial and extraterrestrial rocks (e.g. publications 1, 5, 12, 23, 35, 46, 57, 61 etc..).
- Low temperature study of crystalline material *in situ* by single crystal X-ray diffraction (i.e. using cryojet systems mounted on area detector diffractometer). These studies are devoted to the investigation of crystalline materials with ferroelectric and magneto-electric properties (e.g. publication 7). Few more applications recently on development regards the analysis of spectroscopic data at low temperature in order to apply the results to the shadow zones on planetary bodies (e.g. 15).
- Elasticity: All the experimental methods above mentioned are fundamental experimental tools for the characterization of crystalline material under non-ambient conditions. Analysis of these experimental results requires knowledge of linear and non-linear elasticity. To this aim most of my latest research had been devoted to further extend and simplify elasticity theories to be applied to crystalline material (e.g. publications 18, 21, 26, 39, 78 etc...). The recently developed EoSFit7c program allows users with basic knowledge on elasticity to expand their capabilities for data analysis including linear and non-linear elasticity in a simple manner.
- Elastic Barometry: Expanding the limits for linear and non-linear elasticity intrinsically means dealing with more complex system such as “host-inclusion systems” where the elastic response of the single-phase components needs to be combined to allow the evaluation of the elastic response of the multicomponent system (e.g. publication 19, 22, 26, 27). Such multicomponent systems are among the most common cases on several disciplines going from earth sciences to material sciences (i.e. from mantle minerals to cements). Within the framework of the recently developed EoSFit7c program (publication 18) the “isomeke tool” has been developed and is still currently under development. Such tools will allow the retrieval of the entrapment pressures by means of linear and non-linear elasticity of two isotropic spherical components (host-inclusion) system also accounting for elastic relaxation effects. In collaboration with R.J. Angel and ML Mazzucchelli we carried out a significant developments are aimed to expanding the program capabilities to handle anisotropic and non-spherical inclusion-host systems that is now included in both EoSFit and EntraPT software that are publicly available free of charge at the mineralogylab.com website.
- Diamonds are of fundamental carrier of information from the deep Earth and from the outer space. The investigation of mineral inclusions in diamonds can provide a wealth of information on the Earth mantle state and processes (e.g. publications 33, 34). I started to carry out research on such topic while member of the INDIMEDEA project funded by the European community to F. Nestola (#307322). At the same time, diamond itself can be used to retrieve insight into large scale planetary processes such as impact cratering as well as to shed light on the origin of primordial carbon in the early solar system. Currently this part of my research is sustained by one research grant funded by the Italian Ministry for Research and University (MIUR, project code: R164WEJAHH) titled IMPACT (StackIng disorder in diaMonds as a tool for investigating imPAct CraTers). One of my PhD student (Mara Murri) has been supported during her master degree by a small research grant (5.000\$) awarded by the Barringer Family (Barringer award for impact cratering research) to carry out part of the project.



Prof. Matteo Alvaro

Pavia, March 2024