

CURRICULUM VITAE ET STUDIORUM
FOR
PROF. MATTEO ALVARO



FULL PROFESSOR OF MINERALOGY
UNIVERSITY OF PAVIA
RECTOR'S DELEGATE FOR INTERNATIONAL AFFAIRS IN EUROPE
VICE PRESIDENT OF GLOBEC - "CENTER FOR GLOBAL STRATEGIC ENGAGEMENT"
(Last update Dec 2021)

• **PERSONAL DETAILS AND CONTACT INFORMATION**

Date of birth: December 3rd 1982 (39 years old)

City of birth: Milan (Italy)

Nationality: Italian

E-mail: matteo.alvaro@unipv.it

Present address: Via V. Gioberti, 32 I-27010 Vellezzo Bellini (Pavia), Italy

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

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ORCID: 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
- 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

• 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 $P2_1/c - C2/c$ 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**

• 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

• INSTITUTIONAL RESPONSIBILITIES (governing bodies in bold)

- 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 – 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

• **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)

• **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

• **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)**

- **FELLOWSHIPS AND GRANTS (role in bold)** 3 funded research projects as principal investigator (>2.3M€) and 3 as co-PI or supervisor (>600k€). 10 national and international funded research projects as team member. Principal investigator and co-investigator of 9 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.I/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 - 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, FARE-MIUR n. R164WEJAHH - € 234,255). **Principal Investigator.**
- 2019 – 2022 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 – “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**

- **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)

• **MENTORING ACTIVITIES:** Advisor and Co-advisor for >20 students (BSc, MSc, PhD and post-docs)

• **Postdoctoral researchers (12 researchers)**

- 2017 – 2018 Claudia Stangarone (Ab-initio calculations, crystallography now at DLR Germany)
- 2017 – Mattia Gilio (metamorphic petrology, geochemistry)
- 2017 – 2021 Marco Piazzì (solid state physics, magnetism)
- 2018 – 2020 Mattia Luca Mazzucchelli (Finite Element Modeling, now Alexander Von Humboldt Fellow at University of Mainz)
- 2018 – 2019 Davide Comboni (complex structures at high-P and T, now at ESRF)
- 2019 – 2020 Davide Novella (synthesis at high-P and T, now at University of Padova)
- 2019 – 2020 Mara Murri (DFT on mineral inclusions, now at University of Milano Bicocca)
- 2019 – 2021 Mattia Bonazzi (geochemistry of mineral inclusions)
- 2020 – Joseph P. Gonzalez (mineral inclusions in non-cubic host) funded by NSF grant
- 2021 – Hugo van Schroyen Lantman (microscale deformation of mineral inclusions)
- 2021 – Marta Morana (x-ray diffraction on mineral inclusions)
- 2021 – Nicola Mari co-funded with INAF (Mercury surface analogue)

• **Graduate students (PhD, 10 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. Now Alexander Von Humboldt Fellow at University of Mainz.
- 2016 – 2019 *Nicola Campomenosi*: Elastic thermobarometry: methods and applications to ultra-high pressure metamorphic rocks (co-supervised at University of Genova). Now Alexander Von Humboldt Fellow at University of Hamburg
- 2016 – 2019 *Mara Murri*: Raman investigation of inclusion under non-hydrostatic deviatoric stress. (Now postdoctoral fellow at University of Milan Bicocca)
- 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 University of Pavia
- 2017 – 2020 *Hugo van Schroyen Lantman*: Elastic geobarometry: bringing back together P-T-t paths and deformation history of Lago di Cignana and Western Gneiss Region, Norway.
- 2017 – 2020 *Marta Morana*: Structure and properties of crystalline inclusions trapped in minerals. Now postdoc at Chemistry Dept., University of Pavia
- 2021 – 2023 *Biswabhanu Puhan*: 3D numerical modeling of complex host inclusion systems.
- 2021 – 2023 *Lisa Baratelli*: Clinopyroxene mineral inclusion in garnet hosts. [University of Milan, supervised by F. Càmarà]

• **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: *Biswabonu Puhan*: Numerical model for fracture analyses (co-supervised with Prof. A. Reali)

• **BIBLIOMETRIC RECORD:**

- 90 Research publications in ISI journals (58 in the past 5 years)
- 2 Invited review articles
- 1 book chapter
- 90% publications in Q1-Q2 journals by citescore metrics for all subject areas
- 30% publications in the top 10% most cited publications worldwide all subject areas [CiteScore]
- 4 Highly cited publications top 1% of the academic field of Geosciences [web of science]
- >190 scientific communications to national and international conferences
- 17 invited and keynote talks and seminar to national and international conferences and institutions
- >1900 citations (>1600 in the past 5 years) [scopus]; >2400 total citations (>2000 in the past 5 years) [google scholar]
- H-index = 23 [scopus]; 26 [google scholar]
- First, corresponding or last author in > 50% of the publications

- **PUBLICATIONS IN PEER-REVIEWED JOURNALS:** 90 publications in high-ranked international peer reviewed journals with more than 2000 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 Trezzano 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).
- 2013.**
10. Periotto B., Angel R., Nestola F., Balić-Žunić T., Fontana C., Pasqual D., **Alvaro M.**, Redhammer G. (2013). High-pressure X-ray study of LiCrSi₂O₆ clinopyroxene and the general compressibility trends for Li-clinopyroxenes. *Physics and Chemistry of Minerals*, 40: 378-399 (IF: 1.403).
 11. Dobson D. P., Miyajima N., Nestola F., **Alvaro M.**, Casati N., Liebske C., Wood I.G. and Walker A.M. (2013) Inherited textures during the perovskite to post-perovskite transition and seismic anisotropy in D". *Nature Geosciences*, 6: 575-578 (IF: 11.668).
 12. Domeneghetti M.C., Fioretti A.M., Cámara F., McCammon C., **Alvaro M.** (2013) Thermal history of nakhlites: a comparison between MIL-03346 and its terrestrial analogue Theo's flow. *Geochimica and Cosmochimica acta*, 121: 571-581 (IF: 4.250).
 13. Guastoni A., Nestola F., Gentile P., Zorzi F., **Alvaro M.**, Lanza A., Peruzzo L, Schiazza M., and Casati N. (2013) Deveroite-(Ce) : a new REE-oxalate from Mount Cervandone, Devero Valley, Western-Central Alps, Italy. *Mineralogical Magazine*, 77(7): 3019-3026 (IMA 2013-003. CNMNC Newsletter No. X, Month 2013, page X). (IF: 1.898)
 14. R. Arletti, G. Vezzalini, S. Quartieri, F. Cámara, **M. Alvaro** (2013) A new framework topology in the dehydrated form of zeolite levyne. *American Mineralogist*, 98: 2063-2074 (IF: 2.059)
- 2014.**
15. Ferrari S., Nestola F., Massironi M., Maturilli A., Helbert J., **Alvaro M.**, Domeneghetti M.C., Zorzi F. (2014) In-situ high-temperature emissivity spectra and thermal expansion of C_{2/c} pyroxenes. *American Mineralogist*, 99(4): 786-792 (DOI: 10.2138/am.2014.4698, IF:1.964)
 16. Gatta G.D., Comboni D., **Alvaro M.**, Lotti P., Cámara F., Domeneghetti M.C. (2014) Thermoelastic behavior and dehydration process of cancrinite. *Physics and Chemistry of Minerals*, 41(5): 373-386 (DOI: 10.1007/s00269-014-0656-2, IF: 1.538).
 17. **Alvaro M.**, Nestola F., Ross N.L., Domeneghetti M.C. and Reznitsky L. (2014) High pressure behavior of thiospinel CuCr₂S₄. *American Mineralogist* 99(5): 908-913 (DOI: 10.2138/am.2014.4689, IF: 1.964).
 18. Angel R.J., Gonzalez-Platas J., **Alvaro M.** (2014) EosFit-7 and a Fortran module (library) for equation of state calculations. *Zeitschrift fuer Kristallographie*, 229(5): 405-419 (DOI: 10.1515/zkri-2013-1711, IF: 1.310) (highly cited paper)

19. Angel R.J., Mazzucchelli M.L., **Alvaro M.**, Nimis P., and Nestola F. (2014) Geobarometry from host-inclusion systems: the role of elastic relaxation. *American Mineralogist*, 99(10): 2146-2149 (DOI: 10.2138/am-2014-5047, IF: 1.964).
20. Dobson D., Lindsay-Scott A., Wood I.G., Nestola F., **Alvaro M.**, Casati N., Liebske C., Knight K.S. (2014) Time-of-flight neutron powder diffraction with milligram samples: the crystal structures of NaCoF₃ and NaNiF₃ post-perovskites. *Journal of Applied Crystallography* 47: 1-9 (doi:10.1107/S1600576714021803, IF: 3.984).
- 2015.**
21. Pandolfo F., Cámara F., Domeneghetti M.C., **Alvaro M.**, Nestola F., Karato S., Amulele G. (2015) Volume thermal expansion along the jadeite–diopside join. *Physics and Chemistry of Minerals*, 42(1): 1-14 (DOI: 10.1007/s00269-014-0694-9, IF: 1.585)
22. Angel R.J., **Alvaro M.**, Nestola F., Mazzucchelli M.L. (2015) Diamond thermoelastic properties and implications for determining the pressure of formation of diamond inclusion systems. *Russian Geology and Geophysics*, 56: 225-234. (IF: 2.019)
23. **Alvaro M.**, Domeneghetti M.C., Marinangeli, L. (2015) A new calibration to determine the closure temperatures of Fe-Mg ordering in augite from nakhlites. *Meteoritics and Planetary Science*, 50(3): 499-507 (IF: 2.819).
24. Malaspina N., **Alvaro M.**, Campione M., Wilhelm W., Nestola F. (2015) Dynamics of mineral crystallization from precipitated slab-derived fluid phase: first in-situ synchrotron x-ray measurements. *Contributions to Mineralogy and Petrology*, 169: 26: 1-12. (IF: 3.218)
25. Scandolo L., Mazzucchelli M.L., **Alvaro M.**, Domeneghetti M.C., Nestola F. (2015) Thermal expansion behavior of orthopyroxenes: the role of the Fe-Mn substitution. *Mineralogical Magazine*, 79(1): 71-87. (IF: 2.212)
26. Milani S., Nestola F., **Alvaro M.**, Mazzucchelli M.L., Domeneghetti M.C., Geiger C.A. (2015) Diamond-garnet geobarometry: The role of garnet compressibility and expansivity. *Lithos*, 227: 140-147. (IF: 3.723)
27. Angel R.J., Nimis P., Mazzucchelli M.L., **Alvaro M.**, and Nestola F. (2015) How large are departures from lithostatic pressure? Constraints from host-inclusion elasticity. *Journal of Metamorphic Geology*, 33 (8): 801-813 (doi: 10.1111/jmg.12138, IF: 3.673).
28. Periotto B., Anzolini C., Andreozzi G., Woodland A., Lenaz D., **Alvaro M.**, Princivalle F. (2015) Equation of state of hercynite spinel, FeAl₂O₄, and high-pressure systematics of Mg-Fe-Cr-Al spinels. *Mineralogical Magazine*, 72(2): 285-294. (IF: 2.212)
29. **M. Alvaro**, R.J. Angel, C. Marciano, S. Milani, G. Zaffiro, L. Scandolo, M.L. Mazzucchelli, G. Rustioni, M.C. Domeneghetti, F. Nestola (2015) A new micro-furnace for “in situ” high-temperature single crystal X-ray diffraction measurements. *Journal of Applied Crystallography*, 48 (4): 1192-1200. (IF: 2.570)
30. Angel R.J., Milani S., **Alvaro M.**, Nimis P., Nestola F. (2015) OrientXplot: A software for processing host inclusion orientation data. *Journal of Applied Crystallography*, 48 (4): 1330-1334. (IF: 2.570)
- 2016.**
31. Nestola, F., Burnham, A.D., Peruzzo, L., Tauro, L., **Alvaro, M.**, Walter, M.J., Gunter, M., Kohn, S.C. (2016): Tetragonal Almandine-Pyrope Phase, TAPP: finally a name for it, the new mineral jeffbenite. *Mineralogical Magazine*, 79(7):1219-1232.
32. P. Nimis, **M. Alvaro**, F. Nestola, R.J. Angel, K. Marquardt, G. Rustioni, J. Harris (2016) First evidence of hydrous silicic fluid films around solid inclusions in gem-quality diamonds. *Lithos*, 260: 384-389. (RBSI140351: MILE DEEp)
33. J. Gonzalez-Platas, **M. Alvaro**, F. Nestola and R.J. Angel (2016) EosFit7-GUI: A new GUI tool for equation of state calculations, analyses, and teaching. *Journal of Applied Crystallography*, 49: 1377-1382 (10.1107/S1600576716008050). (RBSI140351: MILE DEEp) (*highly cited paper*)
34. Nestola F., **Alvaro M.**, Casati M.N., Wilhelm H., Kleppe A., Jephcoat A.J., Domeneghetti M.C., Harris J.W. (2016) Source assemblage types for cratonic diamonds from X-ray synchrotron diffraction. *Lithos*, 265: 334-338. (RBSI140351: MILE DEEp)
35. M. Murri, L. Scandolo, A. Fioretti, M.C. Domeneghetti and **M. Alvaro** (2016). Fe-Mg equilibrium behaviour in augite: implications for the thermal history of terrestrial and extraterrestrial rocks. *American mineralogist* 101 (12), 2747-2750. (RBSI140351: MILE DEEp)
36. Angel R.J., Milani S., **Alvaro M.**, Nestola F. (2016) High quality structures at high pressure? Insights from

inclusions in diamonds. *Zeitschrift für Kristallographie*, 231(8): 467-473.

37. Nestola F., **Alvaro M.**, Pearson D.G., Shirey S.B. (2016) "The nature of diamonds and their use in Earth's study", Special issue preface. *Lithos*, 265: 1-3. (RBSI140351: MILE DEEp)
38. Jones AP, **Alvaro M.**, Nestola F, Dobson D, Hazael R, McMillan P, Moore M, Prencipe M, Salzmann C, Wyllie R (2016) Structural characterization of natural diamond shocked to 60 GPa; implications for Earth and planetary systems. *Lithos*, 265: 214-221. (RBSI140351: MILE DEEp)
- 2017.**
 39. S. Milani, R.J. Angel, L. Scandolo, M.L. Mazzucchelli, T. Boffa-Ballaran, S. Klemme, M.C. Domeneghetti, R. Miletich, K. Scheidl, M. Derzsi, K. Tokár, M. Prencipe, **M. Alvaro**, F. Nestola (2017) Elastic behaviour of grossular garnets at high pressure and temperature. *American Mineralogist*, 102(4): 851-859. (RBSI140351: MILE DEEp)
 40. R.J. Angel, **M. Alvaro**, J. Gonzalez-Platas, F. Nestola (2017) A simple and general PVT Eos for structural phase transitions, implemented in EosFit and applied to quartz. *Contribution to Mineralogy and Petrology*, 172(5): 29. (RBSI140351: MILE DEEp)
 41. Mills S.J., Kampf A., Nestola F., Williams P., Leverett P., Hejazi L., Hibbs D., **Alvaro M.**, Kasatkin A. (2017) Wampenite, C₁₈H₁₆, a new organic mineral from the fossil conifer locality at Wampen, Bavaria, Germany, *European Journal of Mineralogy*, 29: 511-515.
 42. Ross J. Angel, Mattia L. Mazzucchelli, **Matteo Alvaro**, Fabrizio Nestola (2017) EosFit-Pinc: a simple GUI for host-inclusion elastic barometry (Letter). *American Mineralogist*, 102(9): 1957-1960. (RBSI140351: MILE DEEp)
- 2018.**
 43. R.J. Angel, **M. Alvaro**, F. Nestola (2018) 40 years of mineral elasticity: a critical review and a new parameterisation of Equations of State for mantle olivines and diamond inclusions. *Physics and Chemistry of Minerals*, 1-19. DOI 10.1007/s00269-017-0900-7 (Invited Review, RBSI140351: MILE DEEp)
 44. Mattia L. Mazzucchelli, Ross J. Angel, Pamela Burnley, Fabrizio Nestola, **Matteo Alvaro** (2018) Elastic geothermobarometry: Corrections for the geometry of the host-inclusion system. *Geology*, 46(3), 231-234. (RBSI140351: MILE DEEp, 714936: TRUE DEPTHS, doi: 10.1130/G39807.1) (*highly cited paper*)
 45. C. Anzolini, M. Prencipe, **M. Alvaro**, C. Romano, A. Vona, S. Lorenzon, E. M. Smith, and F. Nestola (2017) Depth of formation of super-deep diamonds: Raman barometry of CaSiO₃-walstromite inclusions. *American Mineralogist*, 103 (1), 69-74. (RBSI140351: MILE DEEp, 714936: TRUE DEPTHS)
 46. Murri M., Camara F., Adam J., Domeneghetti M.C., **Alvaro M.** (2018) Intracrystalline "geothermometry" assessed on clino- orthopyroxenes bearing synthetic rocks. *Geochimica et Cosmochimica Acta*, 227, 133-142. (RBSI140351: MILE DEEp, R164WEJAHH: IMPACT, 714936: TRUE DEPTHS)
 47. F. Nestola, N. Korolev, M. Kopylova, N. Rotiroti, D.G. Pearson, M.G. Pamato, **M. Alvaro**, J. Gurney, A.E. Moore, J. Davidson (2018) CaSiO₃ perovskite in diamond indicates the recycling of oceanic crust into the lower mantle. *Nature* 555, 237-241 (RBSI140351: MILE DEEp, 714936: TRUE DEPTHS).
 48. Campomenosi N., Mazzucchelli M.L., Mihailova M.D., Scambelluri M., Angel R.J., Nestola F., Reali A., **Alvaro M.** (2018) How geometry and anisotropy affect residual strain in host-inclusion systems: Coupling experimental and numerical approaches. *American Mineralogist*, 103 (12), 2032-2035. 10.2138/am-2018-6700CCBY (RBSI140351: MILE DEEp, 714936: TRUE DEPTHS)
 49. Mara Murri, Mattia L. Mazzucchelli, Nicola Campomenosi, Andrey V. Korsakov, Mauro Prencipe, Borianna D. Mihailova, Marco Scambelluri, Ross J. Angel, **Matteo Alvaro** (2018) Raman elastic geobarometry for anisotropic mineral inclusions. *American Mineralogist*, 103 (11), 1869-1872. (RBSI140351: MILE DEEp, 714936: TRUE DEPTHS, 10.2138/am-2018-6625CCBY)
- 2019.**
 50. Angel R.J., Murri M., Mihailova B., **Alvaro M.** (2019) Stress, Strain and Raman Shifts. *Zeitschrift für Kristallographie*, 234(2), 129-140. (RBSI140351: MILE DEEp, 714936: TRUE DEPTHS)
 51. Murri, M., **Alvaro, M.**, Angel, R.J., Prencipe, M., and Mihailova, B.D. (2019) The effects of non-hydrostatic stress on the structure and properties of alpha-quartz. *Physics and Chemistry of Minerals*, in press. [714936: TRUE DEPTHS; R164WEJAHH: IMPACT].
 52. Anzolini C., Nestola F., Mazzucchelli M.L., **Alvaro M.**, Nimis P., Gianese A., Morganti S., Marone F., Campione M., and Harris J. (2019) Depth of diamond formation obtained from single periclase inclusions. *Geology*, 47(3), 219-222. (RBSI140351: MILE DEEp, 714936: TRUE DEPTHS, 10.1130/G45605.1)

53. Nimis, P., Angel, R.J., **Alvaro, M.**, Nestola, F., Harris, J.W., Casati, N., and Marone, F. (2019) Crystallographic orientations of magnesiochromite inclusions in diamonds: what do they tell us? *Contributions to Mineralogy and Petrology*, in press. [714936: TRUE DEPTHS].
 54. Stangarone, C., Angel, R.J., Prencipe, M., Campomenosi, N., Mihailova, B., and **Alvaro, M.** (2019) Measurement of strains in zircon inclusions by Raman spectroscopy. *European Journal of Mineralogy*, in press. [R164WEJAHH: IMPACT; 714936: TRUE DEPTHS].
 55. Stangarone, C., Angel, R.J., Prencipe, M., Mihailova, B., and **Alvaro, M.** (2019) New insights into the zircon-reidite phase transition. *American Mineralogist*, 104(6), pp. 830-837. [714936: TRUE DEPTHS; R164WEJAHH: IMPACT].
 56. G. Zaffiro, R.J. Angel, **M. Alvaro** (2019) Constraints on the Equations of State of stiff anisotropic minerals: rutile, and the implications for rutile elastic barometry. *Mineralogical Magazine*, 83(3), pp. 339-347. [714936: TRUE DEPTHS]
 57. F. Vetere, M. Murri, **M. Alvaro**, C. M. Domeneghetti, S. Rossi, A. Pisello, D. Perugini, F. Holtz (2019) Viscosity of Pyroxenite Melt and its Evolution during Cooling. *Journal of Geophysical Research – Planets*, in press [714936: TRUE DEPTHS; R164WEJAHH: IMPACT]
 58. Borianna Mihailova, Naemi Waesermann, Claudia Stangarone, Ross J. Angel, Mauro Prencipe, **Matteo Alvaro** (2019) The pressure-induced phase transition(s) of ZrSiO₄: revised Experimental proof for the existence of a new high-pressure polymorph of zircon. *Physics and Chemistry of Minerals*, in press.
 59. Mara Murri, Rachael L. Smith, Kit McColl, Martin Hart, **Matteo Alvaro**, Adrian P. Jones, Péter Németh, Christoph G. Salzmann, Furio Corà, Maria C. Domeneghetti, Fabrizio Nestola, Nikolay V. Sobolev, Sergey A. Vishnevsky, Alla M. Logvinova, Paul F. McMillan (2019) Quantifying hexagonal stacking in diamond. *Scientific Reports*, in press [R164WEJAHH: IMPACT]
 60. Mattia Bonazzi, Simone Tumiati, Jay Thomas, Ross J Angel, **Matteo Alvaro** (2019) Assessment of the reliability of elastic geobarometry with quartz inclusions. *Lithos*, in press. [714936: TRUE DEPTHS]
 61. Mara Murri, Maria C. Domeneghetti, Anna M. Fioretti, Fabrizio Nestola, Francesco Vetere, Diego Perugini, Alessandro Pisello, Manuele Faccenda, **Matteo Alvaro** (2019) Cooling history and emplacement of a pyroxenitic lava as proxy for understanding Martian lava flows. *Scientific Reports*, in press. [R164WEJAHH: IMPACT; 714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
 62. Marco Piazzzi, Marta Morana, Marco Coisson, Federica Marone, Marcello Campione, Luca Bindi, Adrian P Jones, Enzo Ferrara, **Matteo Alvaro** (2019) Multi-analytical characterization of Fe-rich magnetic inclusions in diamonds. *Diamond and Related Materials*, 98, 107489. [R164WEJAHH: IMPACT]
 63. Mattia Luca Mazzucchelli; Alessandro Reali; Simone Morganti; Ross J Angel; **Matteo Alvaro** (2019) Elastic geobarometry: relaxation of elastically anisotropic inclusions. *Lithos*, 350-351, 105218. 10.1016/j.lithos.2019.105218 [714936: TRUE DEPTHS]
 64. Joseph P. Gonzalez, Jay B. Thomas, Suzanne L. Baldwin, **Matteo Alvaro** (2019) Quartz-in-garnet and Ti-in-Quartz (QuiG-TiQ) thermobarometry: Methodology and first application to a quartzofeldspathic gneiss from the (ultra)high-pressure terrane in eastern Papua New Guinea. *Journal of Metamorphic Geology*, in press. [714936: TRUE DEPTHS]
 65. Ross J Angel, Francesca Miozzi, **Matteo Alvaro** (2019) Limits to the Validity of Thermal-Pressure Equations of State. *Minerals*, 9 (9), 562 [714936: TRUE DEPTHS].
 66. Martha G Pamato, Fabrizio Nestola, Davide Novella, Joseph R Smyth, Daria Pasqual, G Gatta, **Matteo Alvaro**, Luciano Secco (2019) The High-Pressure Structural Evolution of Olivine along the Forsterite–Fayalite Join. *Minerals* 9(12), 790 [714936: TRUE DEPTHS]
- 2020.**
67. **Alvaro, M.**, Mazzucchelli, M.L., Angel, R.J., Murri, M., Campomenosi, N., Scambelluri, M., Marone, F., Korsakov, A., and Morana, M. (2020) Fossil subduction recorded by quartz from the coesite stability field. *Geology* 48 (1), 24-28 [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar, 10.1130/G46617.1] (*highly cited paper*)
 68. N. Campomenosi, M. L. Mazzucchelli, B. D. Mihailova, R. J. Angel, **M. Alvaro** (2020) Using polarized Raman spectroscopy to study the stress gradient in mineral systems with anomalous birefringence. *Contributions to Mineralogy and Petrology* 175 (2), 16 [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
 69. RJ Angel, **M Alvaro**, P Schmid-Beurmann, H Kroll (2020) Commentary on ‘Constraints on the Equations of State of stiff anisotropic minerals: rutile, and the implications for rutile elastic barometry’. *Mineralogical Magazine*, 1-10. [714936: TRUE DEPTHS]
 70. S Morganti, ML Mazzucchelli, **M Alvaro**, A Reali (2020) A numerical application of the Eshelby theory for geobarometry of non-ideal host-inclusion systems. *Meccanica* (2020) 55:751–764. 10.1007/s11012-020-01135-z [714936: TRUE DEPTHS]

71. Péter Németh, Kit McColl, Rachael L Smith, Mara Murri, Laurence AJ Garvie, **Matteo Alvaro**, Béla Pécz, Adrian P Jones, Furio Cora, Christoph G Salzmann, Paul F McMillan (2020) Diamond-graphene composite nanostructures. *Nano Letters*, 20(5), pp. 3611–3619. [R164WEJAHH: IMPACT; 714936: TRUE DEPTHS]
72. Campione, M., La Fortezza, M., **Alvaro, M.**, Scambelluri, M., and Malaspina, N. (2020) Commensurate Growth of Magnetite Microinclusions in Olivine under Mantle Conditions. *Acs Earth and Space Chemistry*, 4(6), 825–830. [PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
73. Campomenosi, N., Rubatto, D., Hermann, J., Mihailova, B., Scambelluri, M., and **Alvaro, M.** (2020) Establishing a protocol for the selection of zircon inclusions in garnet for Raman thermobarometry. *American Mineralogist*, 105(7), 992–1001. [PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
74. Morana, M., Mihailova, B., Angel, R.J., and **Alvaro, M.** (2020) Quartz metastability at high pressure: what new can we learn from polarized Raman spectroscopy? *Physics and Chemistry of Minerals*, 47(8).
75. Nestola, F., Goodrich, C.A., Morana, M., Barbaro, A., Jakubek, R.S., Christ, O., Brenker, F.E., Domeneghetti, M.C., Dalconi, M.C., **Alvaro, M.**, Fioretti, A.M., Litasov, K.D., Fries, M.D., Leoni, M., Casati, N.P.M., Jenniskens, P., and Shaddad, M.H. (2020) Impact shock origin of diamonds in ureilite meteorites. *Proceedings of the National Academy of Sciences*, 117(41), 25310–25318. [R164WEJAHH: IMPACT]
76. RJ Angel, ML Mazzucchelli, **M Alvaro**, F Nestola (2020) “EosFit-Pinc: A simple GUI for host-inclusion elastic thermobarometry”—Reply to Zhong et al. *American Mineralogist*, 105, 1587–1588. [714936: TRUE DEPTHS]
- 2021.**
77. Mattia Luca Mazzucchelli, Ross John Angel, **Matteo Alvaro** (2021) EntraPT: an online platform for elastic geothermobarometry. *American Mineralogist*, 106(5), pp. 830–837 [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
78. Kira A. Musiyachenko, Mara Murri, Mauro Prencipe, Ross J. Angel, **Matteo Alvaro** (2021) A Grüneisen tensor for rutile and its application to host-inclusion systems. *American Mineralogist*, 106(10), pp. 1586–1595. [714936: TRUE DEPTHS]
79. Hugo W. van Schrojenstein Lantman, Marco Scambelluri, Mattia Gilio, David Wallis, **Matteo Alvaro** (2021) Extensive fluid-rock interaction and pressure solution in a UHP fluid pathway recorded by garnetite, Lago di Cignana, Western Alps. *Journal of Metamorphic Geology*, 39(4), pp. 501–518 [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
80. 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]
81. Mattia Gilio, Ross Angel, and **Matteo Alvaro** (2021) Elastic geobarometry: how to work with residual inclusion strains and pressures. *American Mineralogist*, 106(9), pp. 1530–1533 [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
82. Nicola Campomenosi, Marco Scambelluri, Ross J. Angel, Joerg Hermann, Mattia L. Mazzucchelli, Borianna Mihailova, Francesca Piccoli, **Matteo Alvaro** (2021) Using the elastic properties of zircon-garnet host-inclusion pairs for thermobarometry of the Ultrahigh Pressure Dora-Maira whiteschists: problems and perspectives. *Contributions to Mineralogy and Petrology*, 176(5), 36 [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar]
83. M.G. Pamato, D. Novella, D.E. Jacob, B. Oliveira, D.G. Pearson, S. Greene, J.C. Afonso, M. Favero, T. Stachel, **M. Alvaro**, F. Nestola (2021) Protogenetic sulfide inclusions in diamonds date the diamond formation event using Re-Os isotopes. *Geology*, 49(8), pp. 941–945 [714936: TRUE DEPTHS]
84. Lucie Tajčmanová, Paola Manzotti, **Matteo Alvaro** (2021) Under pressure: High-pressure metamorphism in the Alps. *Elements*, 17(1), pp. 17–22 [714936: TRUE DEPTHS] (*Invited*)
85. Angel RJ, **Alvaro M.**, Nestola F (2021) Crystallographic methods for non-destructive characterization of mineral inclusions in diamonds. *Reviews in Mineralogy and Geochemistry*, in press. [714936: TRUE DEPTHS]
86. Anna Barbaro, Maria Chiara Domeneghetti, Konstantin D Litasov, Ludovic Ferrière, Lidia Pittarello, Oliver Christ, Sofia Lorenzon, **Matteo Alvaro**, Fabrizio Nestola (2021) Origin of micrometer-sized impact diamonds in ureilites by catalytic growth involving Fe-Ni-silicide: The example of Kenna meteorite. *Geochimica et Cosmochimica Acta* 309, 286–298 [R164WEJAHH: IMPACT]
87. F Nestola, S Ferrari, MG Pamato, G Redhammer, J Helbert, **M Alvaro**, MC Domeneghetti (2021) The best temperature range to acquire reliable thermal infrared spectra from orbit. *Scientific Reports* 11(1), 1–6. [R164WEJAHH: IMPACT]
88. JP Gonzalez, ML Mazzucchelli, RJ Angel, **M Alvaro** (2021) Elastic geobarometry for anisotropic inclusions in anisotropic host minerals: Quartz-in-zircon. *Journal of Geophysical Research: Solid Earth*, 126(6), e2021JB022080 [714936: TRUE DEPTHS; PRIN 2017 - Prot. 2017ZE49E7: Dynastar; NSF JPG]
89. 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]

90. 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]
- 91.

• **ORGANIZATION OF SCIENTIFIC MEETINGS:** Member of the organizing committee and convener for several national and international workshops, conferences and 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

• **MEETINGS CONFERENCES, SEMINARS AND WORKSHOPS:** More than 190 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 NaMe₃+Si₂O₆ 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. **Geitalia 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.**, Cámara 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 nakhlites: 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.**, Cámara 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 lewyne: 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 Nakhllites. **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 nakhllites. **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 Nestola. 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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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*.

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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., McMillann 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., McMillann 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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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-SoGeI-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, Boriana 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. Piazzzi 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. Piazzzi, M., Morana, M., Coisson, 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., Tumiati 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 Schroyen 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 Precipe, 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, Boriana Mihailova, Mauro Precipe, 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 Tumiati 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**

• 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.

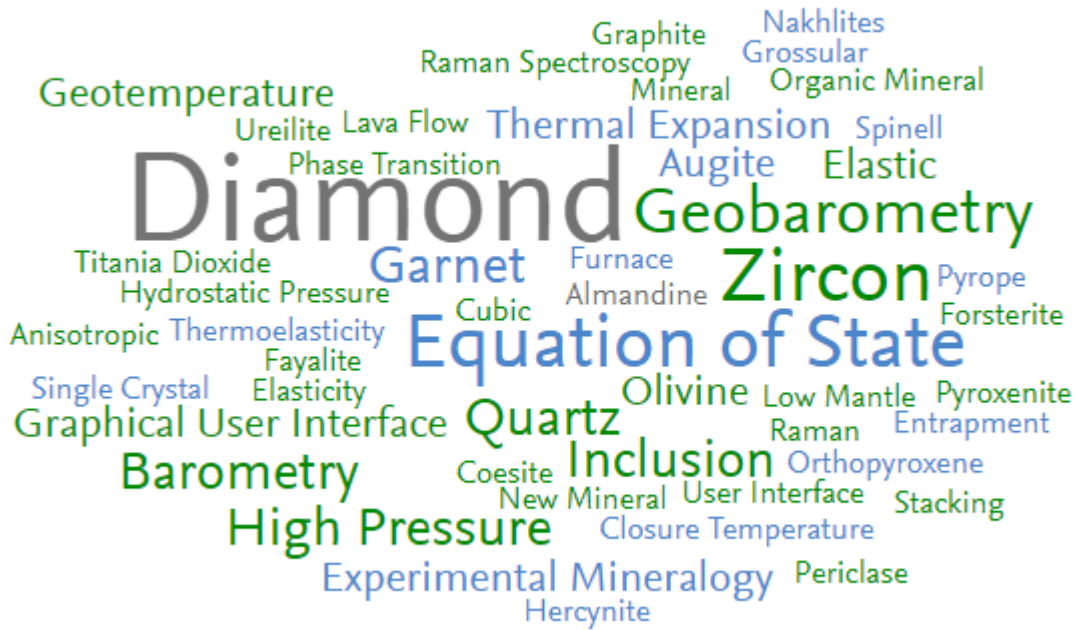
The first two years of work within the framework of the INDIMEDEA project allowed me to start revisiting general elasticity theory (*e.g.* see publications 1,3,6,8,10,15) to prepare the ground for re-writing a newly developed elasticity formalism. Development of these ideas allowed me to obtain some 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.
- 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.
- Host-inclusion systems: 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. Furthermore, current developments are aimed to expanding the program capabilities to handle anisotropic and non-spherical inclusion-host systems.



Prof. Matteo Alvaro

Pavia, Jan 2022