Serena Dominijanni

Curriculum vitae

Nationality: Italian
Languages : Italian (native speaker), English (fluent), French (beginner).
Work contacts: serenadominijanni@cnr.it ; serena.dominijanni@issmc.cnr.it
Affiliation: CNR-ISSMC, URT Università degli studi di Roma Tre, Italy

RESEARCH INTEREST

- Physics and chemistry of Earth and planetary interiors
- Physicochemical processes in silicate glasses, melts, and magmas
- Elastic properties of minerals, alloys and amorphous materials at HP-HT
- Phase diagram, oxygen fugacity and solid-melt phase relations
- Termodynamic properties of minerals and fluids
- Redox state of mantle minerals and volcanic glasses

SCIENTIFIC EXPERTISE

High pressure experimental procedures

- **Diamond anvil cell** (BX90, Le Toullec, Mao-Bell designs): diamonds alignment, gasket preparation (Ruby fluorescence and Raman systems) and sample loading for laser heating and room temperature experiments. Sub-solidus and melting experiments at HP and HT using *in-situ* techniques at synchtrotron facilities.

- **Multi anvil**: cell assembly preparation (OEL/TEL: 25/17, 18/11, 10/4, 7/3) for Kawai-type multi anvil apparatus and cubic cell assembly for neutron diffraction (TEL 7 and TEL 10). Sub-solidus and melting experiments at HP and HT using *in-situ* techniques at synchtrotron facilities.

- **Paris-Edinburgh:** *in situ* falling sphere experiments at synchrotron facilities (10/3 cell assembly).

- **Piston Cylinder:** cell assembly preparation and synthesis of materials (1/2'' talk pyrex assembly).

Techniques

- **Diffraction**: conceiving, planning and executing experiments, measurements and data analysis. Specialised on polycrystalline minerals and metal alloys under extreme conditions; solid knowledge on liquid data of Fe and Fe-bearing alloys (meling detection, Solidus-Liquidus); basic knowledge of single crystal X-ray diffraction and powder neutron diffraction.

- **Spectroscopy**: conceiving, planning and executing experiments, measurements and data analysis – conventional and point sorce Mössbauer Spectroscopy, Synchrotron Mössbauer Source; Inelastic X-ray scattering, X-ray absorption spectroscopy; small and wide-angle X-ray scattering; Electron energy-loss spectroscopy, *in-situ* Ultrasonics in LVP, Raman spectroscopy.

- **Thermal Analysis:** knowledge of Conventional and Flash Differential Scanning Calorimetry (DSC) measurements; basic knowledge of thermogravimetry (TGA) and thermomechanical (TMA) analysis.

- **Analytical techniques**: Electron microprobe and scanning electron microscopy: acquisition of chemical analysis and imaging; Focus Ion Beam: extraction of thin lamellae on recovered DAC and multi anvil experiments; Transmission electron microscopy: EDS chemical analyses, imaging, EELS and SAED measurements.

- **Softwares:** Windows operating system, Office and Adobe for daily use. Knowledge of OriginPro, Pyton (basic knowledge) and Gnuplot for advanced and basic data analysis. Knowledge of specific software for data

treatment such as: Dioptas, PDIndexer, GSAS, Jana, EoSfit, Crysalis (basic knowledge), VESTA, MossA and EELSA.

Sample preparation

- **Pellets preparation**: micron thick pellets preparation of different materials using quick press and femto lasers.
- **Polishing**: general polishing procedure and double polishing of samples for high pressure experiments (e.g., ultrasonics)

EDUCATION

09/05/2022 **Dr.rer.nat. (PhD)** in Experimental petrology at the University of Bayreuth (BGI, Bayreuth, Germany) and at the Tohoku University (Sendai, Japan) under the IRTG collaborative research program.
▪Dissertation: Physicochemical properties of Fe-bearing minerals and metal alloys at deep Earth conditions (https://doi.org/10.15495/EPub_UBT_00006720). Mark: magna cum laude

28/03/2018 **Master of Science (**Exploration Geology, University of Rome La Sapienza, Italy)
▪ M.Sc. Thesis: The oxidation state of Fe in ferropericlase and bridgmanite: implications for the origin of superdeep diamonds and the deep carbon cycle. Protocol: 13170/51; Mark: 110/110 cum laude

17/12/2015 **Bachelor of Science (**Geology, University of Rome La Sapienza, Italy)
▪ B.Sc. Thesis: Parameterization of strombolian eruptions through tapings Etna analysis. Protocol: 12112/75; Mark: 105/110;

PROFESSIONAL EXPERIENCE

17/02/2025-Present
Postdoctoral researcher at the GLASS laboratory, CNR-ISSMC (Faenza, Italy-UTR Rome) under the NANOVOLC (Nanoscale dynamics of volcanic processes: Experimental insights and numerical simulations of explosive eruptions) project
- Research project: Understanding Glass and Melt processes

01/02/2024-01/02/2025
Postdoctoral researcher at the CNR-IGAG (Rome, Italy) under the PRIN2022 project CRYSTALKIN
- Research project: Quantifying micro- and nano-CRYSTALlization KINetics of magmas: from laboratory and rea in situ observations to implications on magma fragmentation

01/06/2022 -30/09/2023
Postdoctoral researcher at the IMPMC laboratory, Sorbonne Université, (Paris, France) under the ERC PICKLE and the InSight NASA discovery program mission.
- Research project: Elastic properties, melting and subsolidus phase relations of Fe-Si-S alloys at Mercury's core conditions.

08/05 – 31/07/2019; 11/01 – 31/03/2020
Special Research Student (Tohoku University, Sendai, Japan)
- Research project: Sound velocity and density measurements of Fe-Ni-Si metal alloy at high pressure by performing inelastic X-ray scattering and X-ray diffraction in DAC.

15/07- 25/09/ 2017 **Internship (**BGI, University of Bayreuth, Germany).
- High pressure techniques in the fields of mineralogy, petrology, geochemistry and geophysics.

29/06 – 06/07/2017 **Contributing to the public understanding of science** (INGV, Sicily, Italy). Volcanic activity of Eolian arc and the geodynamic setting of mediterranean area.

15/06 – 06/07/2017 **Traineeship** (INGV, Rome, Italy).
Introduction to high pressure techniques in experimental petology and magmatology.

TEACHING EXPERIENCE

July 2023 Supervision of a second year bachelor students at IMPMC, Sorbonne Université.
January-June 2023 Co-supervision of two second year bachelor students at IMPMC, Sorbonne Université.
September-December 2022 Co-supervision of three second year bachelor students at IMPMC, Sorbonne Université.

SCHOLARSHIPS AND RESEARCH PROJECTS

1 May 2017 - **International Thesis Scholarship.** University of Rome La Sapienza, Italy.
May-July 2019 - January-March 2020. **Rois-Jasso Scholarship**, Thohoku University, Sendai, Japan.
June 2023 - Premier Research Institute for Ultrahigh-pressure Sciences (**PRIUS**) at the **GRC** (Matsuyama, Japan)

PRIZES

8 September 2023 SIMP (Italian Society of Mineralogy and Petrology) **PhD Thesis prize**

EXPERIENCE AT SYNCHROTRON FACILITIES

User at European Synchrotron Radiation facility (ESRF), Grenoble, France
- Synchrotron Mössbauer Source in DAC and recovered MA samples: ID14 (beamtime PI)
- Powder X-ray diffraction in LHDAC: ID15b, ID27
- X-ray absorption near edge structure spectroscopy in DAC at HP-HT: ID24
- Small and Wide-angle X-ray scattering at HT: ID02
- Falling sphere experiments in Paris-Edimburgh press:ID27 (beamtime PI)

User at SPring-8, Japan
- Inelastic X-ray scattering in DAC: BL35XU
- Powder X-ray diffraction in DAC: BL10XU
- Ultrasonic measurements in LVP: BL04B1 (beamtime PI)

User at DESY PETRA III, Hamburg, Germany
- Powder X-ray diffraction in LHDAC: P02.02 beamline (beamtime PI)

User at Japan Proton Accelerator Research Complex (J-PARC), Japan
- Time of flight powder neutron diffraction in LVP: BL11 PLANET beamline

User at SOLEIL (France)
- Powder X-ray diffraction in LHDAC and LVP: PSICHÉ beamline
- Falling sphere experiments in PE cell (UToPEc): PSICHÉ beamline (beamtime PI)

CONFERENCES PARTICIPATION AND ABSTRACTS

FDSC Workshop (Rome, Italy), 30/09-03/10/2025. Analysis of Fast Calorimetry data

6ª Conferenza Alfred Rittmann (Catania, Italy), 18-20/09/2024. Poster: *New viscosity data of volcanic melts*

International School On Hot Rock Avalanches (Rome, Italy), 3–6/06/2024. Quick talk: *Physics and chemistry of Fe-bearing compounds.*

EGU General Assembly 2023 (Vienna, Austria) 23-28/04/2023. Poster: *Melting and subsolidus phase relations of Fe-Si-S alloys at Mercury's core conditions.*

InSight Science Team Meeting 26 (Online attendance) 20-24/03/2023. Mission overview and updates.

InSight Science Team Meeting 25 (London, UK) 14-18/11/2022. Poster: Pierru R., Dominijanni S. et al., *Melting properties and melting phase relations of the Martian mantle from in-situ measurements on iron-rich mineralogical assemblages.*

Academy commission meeting (BGI, Bayreuth, Germany) 12/05/2022. Invited talk. *Invetigation of the combined effect of Si and Ni on elastic properties of pure Fe: implication for Earth's inner core structure and composition.*

EMC 2021: 3rd European Mineralogical Conference (Cracow, Poland) 29/08-2/09 2021. Oral presentation: *Iron oxidation state of ferropericlase coexisting with carbonate and diamond: implications for the origin of superdeep diamonds.*

Seminar at the University of Potsdam (Germany) 11/06/2021. Invited talk. *Sound velocity measurements of B2-Fe-Ni-Si alloy under high pressure by inelastic X-ray scattering: Implications for the composition of Earth's core.*

EMPG-XVII Zoom meeting (Online attendance) 1-3/03/2021. Oral presentation: *Sound velocity measurements of B2-Fe-Ni-Si alloy under high pressure by inelastic X-ray scattering: Implications for the composition of Earth's core.*

ExNRS2021 ZOOM Workshop (Online attendance) 15/01/2021.

Japan Geoscience Union Meeting (JpGU) Conference (Japan) 24-28/05/2020. Poster 1: *Sound velocity of B2-FeNiSi alloy at high pressure determined with inelastic X-ray scattering: Implications for the composition of the Earth's inner core"*.Poster 2: McCammon C. A., Dominijanni S., et al. *Developing a laboratory technique to probe volatile transport in the deep mantle.*

AGU Fall Meeting (San Francisco) 9-13/12/2019. Poster: McCammon C., Dominijanni S. et al. *Deciphering deep volatile cycles in early Earth.*

GeoMünster 2019 (Münster University, Germany) 22-25/09/2019. Oral presentation: *Understanding mantle oxygen fugacity through diamond anvil cell experiments.*

Yes Congress 2019 (Freie Universität in Berlin, Germany) 9-13/09/2019. Oral presentation: *Probing the fo_2 conditions in laser heated DACs experiments using the Fe-Ir redox sensor.*

Earth, Sea and Sky V: International Joint Graduate Program Workshop (Sendai, Tohoku University, Japan) 3-4/06/2019. Poster: *Experimental study of the mantle redox state through DACs experiments.*

International Workshop on Deep Volatile Cycling in the Earth (Tokyo, Japan) 31/05-1/06/2019.
Oral presentation: *Probing the fo_2 variation in laser heated DAC experiments.*

Japan Geoscience Union Meeting (JpGU) Conference (Chiba, Japan) 24-28/05/2019. Poster: *Probing the variation of the oxygen fugacity in diamond anvil cells using the Fe-Ir alloy redox sensor.*

EBS-Workshop on Nuclear Resonance Scattering (ESRF, Grenoble, France) 11-12/03/2019. Poster: *Experimental investigation of the oxygen fugacity in laser heated DAC experiments*"

Electron back scatter diffraction (EBSD) workshop (**BGI, Bayreuth, Germany)** 23-27/07/2018. *Texture and interface analyses using EBSD.*

International Diamond School Bressanone, Italy. 29/01/2018-02/02/2018, Poster: *Experimental investigation of the Fe speciation in the lower mantle minerals at conditions for the diamond formation*"

SIMP conference (Pisa, Italy) 04-06/09/2017, Pisa, Italy. Abstract: Stagno V., Caruso M. & Dominijanni S.: *The speciation of carbon within eclogitic rocks as function of pressure, temperature and oxygen fugacity. Implications for the origin of carbonatitic melts and diamonds*

Carbo-Pat meetings
Project 6 (phase 2): *Determining the oxygen fugacity inside a diamond anvil cell using iron alloy sensors and exploring possibilities to control oxygen fugacity during laser-heated experiments.*
4-5 October 2018, Wehrheim, Germany, Oral presentation
21-22 March 2018, Kloster Steinfeld, Germany, Oral presentation
10-11 October 2019, Wehrheim, Germany, Oral presentation

MANUSCRIPT REVIEWS

Co-review for Journal of Geophysical research: Solid Earth

JOURNAL PUBLICATIONS

D. Di Genova, G. Giuliani, S. Abeykoon, K. Dadwal, S. Sharma, A. Khanna, A. Zandonà, D. Bondar, S. Meyer, L. Calabrò, **S. Dominijanni**, J. Deubener, Intralaboratory calibration of the DSC shift-factor approach for melt viscosity determination: A case study on lead metasilicate glass, *Journal of Non-Crystalline Solids*, (2025), 666, 2025, 123709, ISSN 0022-3093

P. Stabile, L. Fornasini, L. Pasetti, D. Bersani, **S. Dominijanni**, D. Di Genova, C. Romano and E. Paris Characterization of mixed- waste glasses in the CAS system: insights from differential scanning calorimetry and Raman spectroscopy. *Eur. Phys. J. Plus* 140, 739 (2025)

G. Giuliani, D. Di Genova, F. Di Fiore, S. Mollo, **S. Dominijanni**, C. M. Petrone, C. Romano, A. Vona. The rheological evolution of a phonotephritic melt upon variable deformation regimes and degrees of carbonate assimilation. *Chemical Geology*, Volume 680, (2025), 122711, ISSN 0009-2541,

E. Fanesi, D. Di Genova, P. Valdivia, D. Bondar, **S. Dominijanni**, S. Abeykoon, G. Giuliani, A. Kurnosov, G. Giordano, M. Cassetta, A. Vona, C. Romano, F. Arzilli. A review of the Differential Scanning Calorimetry shift–factor approach: Application to Colli Albani melt viscosity and implications for mafic Plinian eruptions. *Journal of Volcanology and Geothermal Research,* (2025), *461(5):108276.*

A. D. Rosa, G. Garbarino, J. E. Rodrigues, E. Mijit, J. Jacobs, D. Bugnazet, S. Pasternak, G. Berruyer, A. Moyne, C. Clavel, F. Perrin, S. Anzellini, C. Meneghini, F. Occelli, X. Zhan, N. Ishimatsu, T. Sakai, S. Boccato, R. Torchio, J.-A. Hernandez, C. J. S. Heath, **S. Dominijanni**, G. Morard, D. Antonangeli, S. Petitdemange, B. Wehinger, M. Mezouar, G. Kovalskii, W. Morgenroth, M. Wilke, A. Di Cicco, M. A. Bouhifd, T. Irifune, K. A. Lomachenko & O. Mathon. New opportunities for high pressure X-ray absorption spectroscopy at ID24-DCM and BM23 with the Extremely Brilliant Source of the ESRF, (2024). *High Pressure Research*.

S. Anzellini, A. Herlihy, **S. Dominijanni**, P. Botella, A. Brooks, L. Burakovsky, A. Pakhomova, D. Errandonea. Phase Diagram of Ruthenium Characterized In Situ by Synchrotron X-ray Diffraction and Ab Initio Simulations. *Results in Physics*, (2024), 65(2–3):107961

L. Libon, G. Spiekermann, I. Blanchard, J. M. Kaa, **S. Dominijanni**, M. J. Sieber, M. Förster, C. Albers, W. Morgenroth, C. McCammon, A. Schreiberg, V. Roddatis, K. Glazyrin, R. J. Husband, L. Hennet, K. Appel, M. Wilke. Reevaluating the fate of subducted magnesite in the Earth's lower mantle. *Physics of The Earth and Planetary Interiors*, (2024), 355: 107238.

S. Abeykoon, C. Howard, **S. Dominijanni**, L. Eberhard, A. Kurnosov, D. J. Frost, T. Boffa Ballaran, H. Terasaki, T. Sakamaki, A. Suzuki, E. Ohtani, A. Sano-Furukawa, J. Abe. Deuterium content and site occupancy in iron sulphide at high pressure and temperature using in situ neutron diffraction experiments. *Journal of Geophysical research:Solid Earth*. (2023)

S. Dominijanni, C. A. McCammon, E. Ohtani, D. Ikuta, T. Sakamaki, T. Ishii, G. Criniti, L. S. Dubrovinsky, S. Khandarkhaeva, T. Fedotenko, K. Glazyrin, H. Uchiyama, H. Fukui, A. Q. R. Baron. Sound velocity measurements of B2-Fe-Ni-Si alloy under high pressure by inelastic X-ray scattering: implications for the composition of Earth's core. *Geophysical Research Letters*, (2022), 49(15), e2021GL096405.

Submitted papers (under review)

S. Dominijanni, L. Calabrò, E. C. Bamber1, G. Giuliani, D. Bondar, P. Valdivia, F Arzilli, G. La Spina, A. Kurnosov, A. Vona, A. Longo, D. Di Genova. Modelling magma viscosity and ascent dynamics of the 472 AD sub-Plinian eruption of Somma-Vesuvius (Italy)

S. Dominijanni, C. A. McCammon, D. J. Frost, L. S. Dubrovinsky, N. Miyajima, E. Koemets, G. Aprilis, S. Chariton, T. Boffa Ballaran, Z. Liu, V. Cerantola and Alexander Chumakov. Calibration of the Fe-Ir redox sensor at high pressure and application to oxygen fugacity in laser heated diamond anvil cell experiments.

R. Pierru, V. Bonnet-Gibet , M. Françoise, **S. Dominijanni**, P. Parisiades, I. Blanchard, L. Andriambariarijaona, B. Zhao, S. Pandolfi, S. Boccato, N. Guignot, A. King, L. Henry, J. Badro, C. Michaut, and D. Antonangeli. Melting properties and melting phase relations of the Martian mantle from in situ measurements on iron-rich mineralogical assemblages

Papers in preparation

S. Dominijanni, V. Stagno, C. A. McCammon, G. Marras, F. Kaminsky, N. Miyajima, D. J. Frost, D. Zedgenizov, A. Rhosental, A. Chumakov and T. Irifune. Ferric iron content in superdeep natural and synthetic ferropericlase: a comparative study with implications for redox mechanisms of diamond formation.To be submitted to *Geochemical Perspective Letters*

S. Dominijanni, S. Anzellini, A. Kurnosov, G. Morard, S. Boccato, T. Fedotenko, and D. Antonangeli. Melting and subsolidus phase relations of Fe-Si-S alloys at Mercury's core conditions.

REFERENCES

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