
CURRICULUM VITAE

Sébastien Merkel
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Professor
Unité Matériaux et Transformations
Université de Lille – Institut Universitaire de France

Born on September 11th, 1974 in
Ambilly, Haute-Savoie, France
Citizenship: French

RESEARCH STATEMENT

My research focuses on understanding the dynamics and formation of the deeper portions of the Earth. I perform experiments under the pressure and temperature of the Earth's interior to study microstructures in polycrystals, their mechanical behaviour, and their relation to phase transformations. I then integrate the results of my experiments into polycrystal numerical models to understand wave propagation through complex microstructures and compare the results of these models to seismic observations. This work aims at understanding the dynamics and formation of the Earth's mantle and inner core.

PROFESSIONAL EXPERIENCE

2010–present: Professor of Physics at the Université de Lille, France
2014–present: Junior member of the Institut Universitaire de France
2006–2010: CNRS research assistant at the Université de Lille, France
2004–2006: Miller fellow at the Department of Earth and Planetary Science, University of California, Berkeley, USA, with Hans-Rudolf Wenk
2002–2004: Japanese Society for the Promotion of Science (JSPS) post-doctoral fellow at the Institute for Solid State Physics, University of Tokyo, Japan, with Takehiko Yagi
1999–2002: PhD student at the Laboratoire des Sciences de la Terre of the Ecole Normale Supérieure de Lyon, France, and the Geophysical Laboratory, Carnegie Institution of Washington, USA. Supervision: Philippe Gillet and Russell J. Hemley
1997–1999: predoctoral fellow at the Geophysical Laboratory, Carnegie Institution of Washington, Washington DC, USA, with Russell J. Hemley

EDUCATION

2009: “Habilitation à diriger les recherches” in Physics at the Université Lille 1, France
1999–2002: PhD in Geology at the Ecole Normale Supérieure de Lyon, France
1997: MSc in Physics at the Ecole Normale Supérieure de Lyon, France
1994–1996: Undergraduate studies in Physics at the Ecole Normale Supérieure de Lyon, France
1992–1994: “Classes préparatoires” at the Lycée du Parc, Lyon, France
1992: Baccalauréat, série C, Lycée International de Ferney Voltaire, France

DISTINCTIONS

2014: Selected as Junior Member of the Institut Universitaire de France
2011: Medal for Research Excellence of the European Mineralogical Union
2002: Mineral and Rock Physics Outstanding Student Award, American Geophysical Union

SCIENTIFIC PRODUCTION

Publications

- 58 publications in peer-reviewed international journals including

- 50% in geophysics and mineralogy (*Phys Earth Planet Inter*, *Geophys Res Lett*, *J Geophys Res*, *Earth Planet Sc Lett*, etc)
- 30% in physics and materials science (*Phys Rev B*, *Acta Mat*, etc)
- 15% on experimental developments (*J Appl Cryst*, *Rev Sci Instrum*, etc)
- 5% in general audience journals (*Science*)
- 11 other publications (editorials, book chapters, thesis, etc)
- Citations statistics (Source: [ResearcherID](#), 02/2018) : 63 records, 1535 citations, h-index: 22

Communications

- 53 invited presentations (seminars, conferences, summer schools, etc)
- 57 other presentations given in person (orals, posters)

SUPERVISION

Post-doctoral fellows

- 2013-2014: Angelika Rosa, fellowship of the Swiss National Fund

PhD student

- 2014–2017: Christopher Langrand, Université de Lille, co-supervised with Nadège Hilairét
Experimental Study of Perovskite / Post-Perovskite Phase Transformation Mechanism and its Kinetics in the Earth Mantle
- 2010–2013: Ainoha Lincot, Université Joseph Fourier, Grenoble, co-supervised with Ph. Cardin
Direct models of Earth inner core seismic anisotropy and study of textures induced by the α - ϵ transition in Fe
- 2009–2013: Caroline Bollinger, Université Lille 1
Rheology of polycrystalline olivine under upper mantle conditions: an in-situ study in the D-DIA
- 2008–2011: Carole Nisr, Université Lille 1, co-supervised with P. Cordier
In-situ characterization of dislocations in minerals under high pressure

Master and undergraduate students

- 2017: Hajar Benouda, Université Lille 1, Undergraduate research project
- 2016: Matthieu Thierry, Université Lille 1, Master research project
- 2015: Agnes Valovics, University of St Andrews, Scotland, Undergraduate research project
- 2015: David Fuseau, Université Lille 1, Undergraduate research project
- 2014: Ali Dia, Université Lille 1, Master Thesis
- 2014: Benjamin Malfait, Guillaume Bonamis, Université Lille 1, Undergraduate research project
- 2013: Loraine Boust, Lycée Malherbe, Caen, Undergraduate research project
- 2012: Amélie Malpot, Ecole Centrale de Lille, Master Thesis
- 2012: Maxime Thiebaut, Rémi Fourier, Université Lille 1, Undergraduate research project
- 2011: Florian Marmuse, Lycée Louis-le-grand, Paris, Undergraduate research project
- 2008: Marion Gruson, Ecole Centrale de Nantes, Master Thesis
- 2007: Carole Nisr, Université Lille 1, Master Thesis
- 2005: Lowell Miyagi, University of California, Berkeley, un-official supervision of the 1st year of PhD thesis, official advisor: Hans-Rudolf Wenk
- 2003: Tristan Ferroir, Ecole Normale Supérieure de Lyon, Undergraduate internship

Technical staff

- Supervision of J. Chantel, Research Engineer, Université de Lille
- Supervision of A. Marin, Technician, CNRS, Université de Lille

International students and visitors

- 2016–now: Feng Lin, PhD candidate at the University of Utah, United States
- 2015–now: Morvarid Saki, PhD candidate and post-doctoral fellow at Universität Münster, Germany
- 2016: Binbin Yue, post-doctoral fellow at HPSTAR, Shanghai, China
- 2011–2012: Angelika Rosa, PhD candidate at ETH Zürich, Switzerland

PROFESSIONAL INVOLVEMENT

Local, Université de Lille

- 2017–now: head of the Physics Department Teaching Committee
- 2017–now: member of the executive committee of the UMET laboratory
- 2010–now: webmaster of the Master of Physics at Université Lille 1 (<http://master-physique.univ-lille1.fr/>)
- 2008–now: webmaster for the UMET laboratory (<http://umet.univ-lille1.fr>)
- 2011–2018: member of the Physics Teaching Department Council
- 2015–2017: member of the scientific advisory committee of the UMET laboratory
- 2013: restructuring of the curriculum in condensed matter physics
- 2008–2014: member of the Laboratory Council
- 2007–2010: member of the Physics Department Recruitment Council

National

- 2009: report on the use of synchrotron in Earth science in France for the Société Française de Minéralogie et Cristallographie

International

- 2015–now: representative for *Dynamics and Extreme Conditions* at the ESRF Users Organisation Committee
- 2015–now: chair for the *Mineral and Rock Physics Early Career Award* at the American Geophysical Union
- 2012–now: member of the executive committee for *Mineral and Rock Physics* at the American Geophysical Union

CONTRIBUTIONS TO SCIENTIFIC MEETINGS

Meetings

- 2017 : co-organizer for the *High Pressure Mineral Physics Seminar*, Saint Malo, France
- 2017 : co-organizer for *Rayons X et Matière*, Villeneuve d'Ascq, France
- 2016, 2017, 2018 : co-organizer of the ESRF user meeting
- 2011: co-organiser of the *Plasticité 2011* workshop in Lille
- 2009, 2011: co-organizer of prospective meeting on synchrotron in Earth science (Lyon and Paris)
- 2012–2014: program officer for *Mineral and Rock Physics* at the American Geophysical Union Fall Meeting (22000 abstracts in 2013, including 450 for MRP)

Sessions

- *European Geoscience Union General Assembly* (2016, 2017, 2018)
- *American Geophysical Union Fall Meeting* (2007, 2010, 2011, 2013, 2014, 2015, 2016)
- *European Mineralogical Conference* (2012)

REVIEWER CONTRIBUTIONS

Dissertation committees

- 2017: Habilitation à Diriger les Recherches, Volodymyr Svitlyk, Université Grenoble Alpes, France
- 2016: PhD Thesis, Arnaud Proietti, Université de Toulouse, France
- 2015: Habilitation à Diriger les Recherches, Agnès Dewaële, Université Pierre et Marie Curie, Paris, France
- 2012: PhD Thesis, Angelika Rosa, ETH Zurich, Switzerland
- 2011: PhD Thesis: Giacomo Lo Nigro Université Blaise Pascal-Clermont-Ferrand II, France

Scientific journals

- About 90 reviews for scientific journals: 55 % in geophysics and mineralogy, 25 % in physics et materials science, 5 % on experimental developments and 10 % in general audience journals (*Science, Nature*)

National evaluations

- Laboratory evaluation for the HCERES, France (2018, IMPMC, Paris)

Funding bodies and large scale facilities

- 2016–now: member of review panel for *Dynamics and Extreme Conditions*, PETRA III synchrotron, Germany
- 2016–now: member of review panel for *Matter & material properties: Structure, Organisation, Characterisation, Elaboration*, SOLEIL synchrotron, France
- Recurrent reviewer for the National Science Foundation (US), the Deutsche Forschungsgemeinschaft (DE), the Agence Nationale de la Recherche (FR), Programme National de Planétologie at INSU, CNRS (FR)
- Evaluation panel member for the Deutsche Forschungsgemeinschaft (DE), IDEX funding schemes (FR), the European Synchrotron Radiation Facility (FR)

RECENT FUNDING

- Recurrent beamtime on international large scale facilities (synchrotrons, free electron lasers, etc): 300 shifts for the group in 2015-2017 (shared with N. Hilairet, P. Raterron, and collaborators). At ESRF, 1 shift costs ~3700 €.
- Programme National de Planétologie, CNRS (2013, 2014, 2016, 2017): 31 k€ in total
- 2018-2021: PI for the ANR-DFG grant “TIMEleSS”, ANR-17-CE31-0025, 755 k€ including 346 k€ in France
- 2017-2020: PhD fellowship from the Université de Lille, ~100 k€
- 2016-2021: High Pressure Research Platform of the Regional Fund Archi-CM, ~450 k€
- 2014-2019: Junior member of the Institut Universitaire de France, 75 k€
- 2014-2017: PhD fellowship from the Université Lille 1 and the Region Hauts de France, ~100 k€
- 2008-2011: PI for the ANR Jeunes Chercheurs grant “DiUP”, ANR-07-5CJC-0136-01, 200 k€
- 2009-2013: co-PI to the ANR grant “Mantle Rheology” (P. Raterron, Université Lille 1), ANR-08-BLAN-0238, 444 k€
- 2009-2012: co-PI to the ANR grant “SUBDEF” (B. Reynard, ENS Lyon), ANR-08-BLAN-0192, 336 k€
- 2007: PI for “Plasticité des phases post-perovskites”, French national program SEDIT, 23 k€.
- 2006: Starting grant (BQR) of the Université Lille 1, 50 k€.

INTERNATIONAL PARTNERSHIPS

- 2018: Hubert Curien Procope partnership with the Westfälische Wilhelms-Universität, Münster, Germany
- 2018-2021: PI for the ANR-DFG grant “TIMEleSS”, ANR-17-CE31-0025
- 2012-2013: Hubert Curien Balaton partnership with Eötvös University, Budapest, Hungary

TEACHING*Undergraduate courses*

- Physics for geologists (24h, 2nd year in geology, course, practicals)
- Physics of the Earth (20h, 3rd year in physics, course)
- Endogenous petrology (8h, 3rd year in geology, course, practicals)

Master classes

- Advanced materials characterization (14h, 2nd year, course, practicals)
- Physics of deformation (10h, 2nd year, course)
- Scientific publishing (8h, 2nd year, course, practicals)

Taught in the past

- Introduction to materials science (master, 1st year, course)
- Scientific computing (master 1st year, course)
- Physics applied to natural sciences (undergraduate, 1st year, course, practicals, labs)
- Newtonian mechanics (undergraduate, 1st year, course)
- Wave and vibrations (undergraduate, 2nd year, practicals, labs)
- Continuum mechanics (undergraduate, 2nd year, labs)
- Information technology (undergraduate, 1st year, practicals)
- Physics for physicians (undergraduate, 1st year, practicals)

Graduate courses and summer schools

- Workshop on *Texture Analysis Using the Rietveld Method from Synchrotron X-ray Diffraction Data*, HPSTAR, Shanghai, China, 19-20 May, 2015
- *Méthodes d'analyse des minéraux et matériaux*, Société Française de Minéralogie et Cristallographie, Paris,

France, 20-21 October 2014

- *Ecole Prédoctorale sur la Terre Interne*, École de Physique des Houches, France, 6-17 Octobre 2014
- *Ecole doctorale observatoire de Strasbourg*, France, March 2011
- *International School of Crystallography*, Erice, Sicile, Italy, 4-14 June 2009
- *Structure et dynamique du manteau profond*, École de Physique des Houches, France, 12-17 October 2008
- *Textures and Microstructures in the Earth Sciences*, DFH-UFA Summer School, Freiberg, Germany, July 2005

Outreach

- Approximately 4 ½-days/y in local high-school with the “Physique itinérante” program of Université Lille 1

SEMINARS AND COMMUNICATIONS

SEMINARS: 19

1. Department of Geology, University of Maryland, United States, July 2017
2. Geophysical Laboratory, Carnegie Institution of Washington, United States, July 2017
3. Institute of Geophysics, ETH Zürich, Switzerland, November 2016
4. Institut Jean Lamour, Université de Lorraine, Nancy, France, June 2016
5. Laboratoire de Géologie, Ecole Normale Supérieure, Paris, France, November 2015
6. Center for High Pressure Science & Technology Advanced Research, Shanghai, China, May 2015
7. Earth, Environmental and Planetary Sciences, Brown University, Providence, RI, USA, April 2015
8. Institut für Mineralogie, Universität Münster, Germany, October 2014
9. Géosciences Montpellier, France, January 2013
10. Bayerisches Geoinstitut, University of Bayreuth, Bayreuth, Germany, May 2012
11. Inst. für Geochemie und Petrologie, ETH Zürich, Switzerland, March 2010
12. Laboratoire de Géophysique Interne et de Tectonophysique, Grenoble, France, October 2009
13. Geodynamic Research Center, Ehime University, Matsuyama, Japan, January 2009
14. Laboratoire Magmas et Volcans, Université Blaise Pascal de Clermont-Ferrand, France, January 2008
15. Laboratoire de Structures et Propriétés de l'Etat Solide, Université des Sciences et Technologies de Lille, France, February 2007
16. Laboratoire de Géologie de l'Ecole normale supérieure, Paris, France, November 2006
17. Berkeley Seismological Laboratory, University of California, Berkeley, USA, November 2004
18. Laboratoire de Structures et Propriétés de l'Etat Solide, Université des Sciences et Technologies de Lille, France, December 2003
19. Laboratoire des Sciences de la Terre, Ecole Normale Supérieure de Lyon, France, 2002

TEACHING IN SUMMER SCHOOLS AND EQUIVALENT: 7

1. Workshop on *Texture Analysis Using the Rietveld Method from Synchrotron X-ray Diffraction Data*, HPSTAR, Shanghai, China, 19-20 May, 2015
2. *Méthodes d'analyse des minéraux et matériaux*, Société Française de Minéralogie et Cristallographie, Paris, France, 20-21 October 2014
3. *Ecole Prédoctorale sur la Terre Interne*, École de Physique des Houches, France, 6-17 Octobre 2014
4. *Ecole doctorale observatoire de Strasbourg*, France, March 2011
5. *International School of Crystallography*, Erice, Sicile, Italy, 4-14 June 2009
6. *Structure et dynamique du manteau profond*, École de Physique des Houches, France, 12-17 October 2008
7. *Textures and Microstructures in the Earth Sciences*, DFH-UFA Summer School, Freiberg, Germany, July 2005

INVITED PRESENTATIONS IN INTERNATIONAL CONFERENCES: 24

1. S. Merkel, In-Situ Studies of Microstructures under Deep Earth Conditions: from Texture Analysis to Multigrain Crystallography, ICOTOM International Conference on the Textures of Materials, St George, UT, USA, November 2017
2. S. Merkel, Stress and microstructures under extreme conditions: advances and opportunities, PETRA IV Workshop: Extreme Conditions Research at the Ultra-Low Emittance Storage Ring PETRA IV, Hamburg, Germany, October 2017
3. S. Merkel, R. Farla, N. Hilairat, Synchrotron-Based Extreme Condition Research Using Large Volume Presses, Research with High Energy X-Rays at Ultra-Low Emittance Sources, Hamburg, Germany, February 2017
4. S. Merkel, Anisotropy and History of the Earth's Inner Core: Forward Models and Input from Mineralogy, Flow in the Deep Earth, Collège de France, Paris, France, December 2016
5. S. Merkel, N. Hilairat, Carlos Tome, Deformation Twinning in Zn under High Pressure and the Effect of c/a Ratio on hcp Metals Plasticity, MRS Fall Meeting, Boston, United States, November 2016
6. S. Merkel, Anisotropy, textures, and slip systems in post-perovskite: experimental approach, ppv@10: a meeting for the 10th anniversary of the discovery of post-perovskite, Bristol, United-Kingdom, June 2014
7. S. Merkel, Extracting of single crystal properties from measurements on polycrystals, Elastic Properties of Iron in Extreme Conditions, Takarazuka, Japan, February 2014

8. S. Merkel, Understanding high pressure plasticity using x-ray diffraction, International Symposium on Plasticity and its Applications, Freeport, Bahamas, January 2014
9. S. Merkel, New experiments for understanding plastic deformation and microstructure under high pressure, European High Pressure Research Group, London, UK, September 2013
10. S. Merkel, C. Nisar, G. Ribarik, T. Ungar, G. Vaughan, P. Cordier, Application of line profile analysis for the study of dislocations in deep Earth minerals, TMS2013, San Antonio, TX, USA, March 2013
11. S. Merkel, Award lecture: 2011 EMU medallist. High pressure plastic behaviour of deep Earth minerals, EMC2012, Frankfurt, Germany, September 2012
12. S. Merkel, Application of Synchrotron Radiation For Understanding The Plastic Properties Of Minerals In The Deep Earth, High Pressure Studies using Synchrotron Radiation: Present and Future, SOLEIL Users' Meeting 2012, Gif-sur-Yvette, France, January 2012
13. S. Merkel, Plasticity under pressure: experiment and models, International Conference of the APS Topical Group on Shock Compression of Condensed Matter, Chicago, IL, USA June 2011
14. S. Merkel, High Pressure Plastic Properties of Hcp Metals: Experiments and Elasto-Plastic Models, TMS 2011 Annual Meeting, San Diego, CA, USA, March 2011
15. S. Merkel, M. Gruson, C.N. Tomé, N. Nishiyama, Y. Wang, Effect of texture on rheological properties: the case of ϵ -Fe, American Geophysical Union fall meeting, San Francisco, CA, USA, December 2009
16. S. Merkel, Plastic properties of deep Earth minerals, Symposium of Japanese-French Frontiers of Science, Shonan Village Center, Kanagawa, Japan, January 2009.
17. S. Merkel, Modeling analysis of the influence of plasticity on x-ray diffraction measurements in high pressure deformation apparatus, Rheology Grand Challenge Workshop on Plastic Deformation of Minerals and the Dynamics of Earth's Deep Interior, MIT, Cambridge, MA, USA, August 2008
18. S. Merkel, High pressure deformation mechanisms from in situ texture measurements, International Conference on the Texture of Materials (ICOTOM), Pittsburgh, PA, USA, June 2008
19. S. Merkel, H.R. Wenk, C. Tomé, Evaluation of stress in high pressure radial diffraction experiments: application to Co, Study of Matter at Extreme Conditions, Miami, FL, USA, April 2007
20. S. Merkel, Plasticity in the diamond anvil cell: implications for deep Earth geophysics, Gordon Research Conference on Research at High Pressure, Biddeford, ME, USA, June 2006
21. S. Merkel, Radial diffraction in the DAC: practical and theoretical considerations, COMPRESS workshop on rheology and elasticity studies at ultrahigh pressures and temperatures, Advanced Photon Source, Argonne National Laboratory, USA, 2005
22. S. Merkel, T. Yagi, N. Miyajima, H.R. Wenk, H.K. Mao, and R.J. Hemley, Deformation of polycrystalline Ca-perovskite up to 50 GPa, American Geophysical Union fall meeting, San Francisco, CA, USA, December 2004
23. S. Merkel, High pressure study of stress, elasticity, and lattice preferred orientations using the diamond anvil cell and x-ray diffraction, IUCr/COMPRES High Pressure Workshop, Non-ambient Crystallography: The Science of Change, Berkeley, CA, USA, December 2003
24. S. Merkel, H.K. Mao, R.J. Hemley, Finite-element modeling of stress and strain in the diamond anvil cell, International Conferences on High Pressure Science and Technology (Airapt), Honolulu, HI, USA July 1999

INVITED PRESENTATIONS IN FRENCH CONFERENCES: 3

1. S. Merkel, Apports des rayons X à l'étude de microstructures sous haute pression, Colloque Rayons X et Matière, Grenoble, France, Decembre 2015
2. S. Merkel, Études expérimentales de plasticité aux conditions de la terre profonde, MECAMAT, Aussois, France, January 2015
3. S. Merkel, Modèles numériques pour l'évaluation de contraintes résiduelles au sein d'échantillons déformés sous pression : application à la phase hexagonale du cobalt, Forum de technologie des hautes pressions, Batz sur Mer, France, 2008

ORAL COMMUNICATIONS GIVEN IN PERSON: 31

1. S. Merkel, N. Hilairt, C. Tomé, The Androgynous Twins of Zinc, ICOTOM International Conference on the Textures of Materials, USA, November 2017
2. C. Langrand, N. Hilairt, A. Rosa, V. Svitlyk, D. Dobson, S. Merkel, Study Of Perovskite / Post-Perovskite Phase Transformation Mechanism By Using Multigrain Crystallography, High Pressure Mineral Physics Seminar, Saint Malo, France, September 2017
3. S. Merkel, C. Langrand, N. Hilairt, Z. Konopkova, D. Andraut, Kinetics Of Bridgmanite To Post-Perovskite Transition in $(\text{Mg}_{0.85}\text{Fe}_{0.15})\text{SiO}_3$, American Geophysical Union fall meeting, San Francisco, CA, USA, December 2016

4. A. D. Rosa, N. Hilairt, S. Ghosh, J. P. Perrillat, G. Garbarino, S. Merkel, Oriented growth and grain size reduction during phase transitions in hydrous Mg_2SiO_4 : Implications for slab strength variations at transition zone depth, European High Pressure Research Group, Bayreuth, Germany, September 2016
5. S. Merkel, A. Lincot, S. Petitgirard, Variant selection in the bcc-hcp transition in Fe, European High Pressure Research Group, Bayreuth, Germany, September 2016
6. S. Merkel, N. Hilairt, R. McCabe, C. N. Tomé, Cyclic response of Zn under high pressure and the effect of c/a ratio on hcp metals plasticity, MecaSens, Grenoble, France, Septembre 2015
7. S. Merkel, A. Lincot, P. Cardin, R. Deguen, A self-consistent model of inner core anisotropy, PURE 2015, Londres, Royaume-Uni, Septembre 2015
8. S. Merkel, P. Raterron, N. Hilairt, Creep of minerals : quantifying effects of pressure and grain boundary vs. intracrystalline processes up to 10 GPa and 1600 K in olivine, CREEP 2015, Toulouse, France, June 2015
9. S. Merkel, A. Malpot, A. Rosa, H. P. Liermann, 3D-XRD Investigation of the High Pressure α - ω Transformation in Polycrystalline Titanium, International Congress on 3D Materials Science, Annecy, France, June 2014
10. S. Merkel, A. Lincot, P. Cardin, Inner core anisotropy: scaling single-crystals elastic properties to seismic measurements, AGU Fall Meeting 2013, San Francisco, CA, USA, December 2013
11. S. Merkel, A. Lincot, S. Petitgirard, P. Cardin, BCC-HCP Transition in Fe: Effect of Stress on Transition Mechanisms and Lattice Preferred Orientations, TMS, San Antonio, TX, USA, March 2013
12. S. Merkel, A. Lincot, S. Petitgirard, P. Cardin, Effects of the bcc-hcp transition on textures and anisotropy in Fe, American Geophysical Union fall meeting, San Francisco, CA, USA, December 2012
13. S. Merkel, C. Nisr, G. Ribárik, T. Ungár, G. Vaughan, P. Cordier, In situ experimental study of dislocations in minerals at high pressure, American Geophysical Union fall meeting, San Francisco, CA, USA, December 2011
14. S. Merkel, C. Nisr, P. Cordier, G. Ribarik, T. Ungar, G. Vaughan, In situ 3D X-ray diffraction study of stresses and dislocations in polycrystals under high pressure: application to $MgGeO_3$ post-perovskite at 80 GPa, MecaSens, Hambourg, Germany, September 2011
15. S. Merkel, M. Gruson, C.N. Tomé, N. Nishiyama, Y. Wang, Textures, contraintes, et mécanismes de déformation plastique dans le fer e, Plasticité, Toulouse, France, March 2010
16. S. Merkel, C.N. Tomé, H.R. Wenk, P. Cordier, Elasto-plastic interpretation of lattice strains measured in non hydrostatic x-ray diffraction data, Study of matter at extreme conditions, Miami - Western Caribbean. March 28 - April 2, 2009
17. S. Merkel, C.N. Tomé, B. Clausen, H.R. Wenk, A modeling analysis of internal elastic strains in polycrystalline cobalt deformed under high pressure, American Geophysical Union fall meeting, San Francisco, CA, USA, December 2008
18. S. Merkel, Elasto-plastic modeling of stress and strain in samples plastically deformed in the diamond anvil cell, International workshop on high pressure science and technology, Shloss Ringberg, Germany, March 2008
19. S. Merkel, A.K. McNamara, A. Kubo, S. Speziale, L. Miyagi, Y. Meng, T.S. Duffy, and H.R. Wenk, Diamond anvil cell study of the plastic deformation of post-perovskite phases: implication for D'' anisotropy, High Pressure Mineral Physics Seminar, Matsushima, Japan, 2007
20. S. Merkel, Plasticité des minéraux du manteau: expériences de déformation au mégabar, Plasticité, Poitiers, France, 2007
21. S. Merkel L. Miyagi A. Kubo S. Speziale T.S. Duffy H.R. Wenk, Étude expérimental et in-situ des propriétés plastiques de la post-perovskite, Réunion des Sciences de la Terre, Dijon, France, 2006
22. S. Merkel, Joints transparents pour la diffraction radiale en cellule diamant, Forum de technologie des hautes pressions, Monthieux, France, 2006
23. S. Merkel, L. Miyagi, A. Kubo, S. Speziale, T.S. Duffy, H.R. Wenk, High pressure deformation of post-perovskite phases, International Symposium on Experimental Mineralogy, Petrology and Geochemistry (EMPG), Bristol, UK, 2006
24. S. Merkel, T. Yagi, and H.R. Wenk Radial x-ray diffraction study of hcp-cobalt under uniaxial deformation: lattice preferred orientation, stress, and elasticity, Study of Matter at Extreme Conditions, Miami, FL, USA, 2005
25. S. Merkel, A. Kubo, S. Speziale, L. Miyagi, H.R. Wenk, T. Duffy, and H.K. Mao, Plastic deformation of $MgGeO_3$ post-perovskite at megabar pressures, American Geophysical Union fall meeting, San Francisco, CA, 2005
26. S. Merkel, N. Miyajima, T. Yagi, Deformation of polycrystalline Ca-perovskite up to 50 GPa, Japan Earth and Planetary Science Joint Meeting, Makuhari, Chiba, Japan, 2004
27. S. Merkel, T. Yagi, High pressure deformation of polycrystalline cobalt with the diamond anvil cell, High Pressure Conference of Japan, Yokohama, Japan, 2003
28. S. Merkel, H. R. Wenk, J. Badro, G. Montagnac, P. Gillet, H. K. Mao, and R. J. Hemley , In situ high-pressure deformation studies of deep earth materials by radial X-ray diffraction, Study of Matter at Extreme Conditions, Miami, FL, USA, 2003
29. S. Merkel , Deformation of lower mantle minerals at high pressure, International Union of Geodesy and Geophysics (IUGG), Sapporo, Japan, 2003
30. P. Gillet, S. Merkel, H.R. Wenk, G. Shen, J. Shu, R.J. Hemley, H.K. Mao , The diamond anvil cell as a

deformation apparatus for investigating the rheology of the deep Earth, American Geophysical Union fall meeting, San Francisco, CA, USA, 2001

31. S. Merkel, Shu, J, Wenk, H.R., Mao, H.K., Gillet, P., Hemley, R.J. , Diamond anvil cell study of the elasticity and texture of FeS₂ pyrite, European Geophysical Society General Assembly, Nice, France, 2000

POSTER COMMUNICATIONS GIVEN IN PERSON: 26

1. S. Merkel, C. Langrand, V. Svitlyk, G. Garbarino, A. Rosa, N. Hilaiet, Investigations of high pressure transformation microstructures using multigrain crystallography, ESRF User meeting, Grenoble, France, February 2018
2. S. Merkel, N. Hilaiet, C. N. Tomé, Les macles androgynes du zinc, Rayons X et matière, Villeneuve d'Ascq, France, November 2017
3. S. Merkel, N. Hilaiet, C. Tome, The Androgynous Twins of Zinc, High Pressure Mineral Physics Seminar, Saint Malo, France, September 2017
4. S. Merkel, C. Langrand, N. Hilaiet, A. Rosa, V. Svitlyk, D. Dobson, Study Of The Perovskite to Post-Perovskite Transformation Using Multigrain Crystallography, EGU General Assembly, Vienna, Austria, April 2017
5. S. Merkel, C. Langrand, A. Rosa, N. Hilaiet, Effect of phase transformations on microstructures in deep mantle materials, EGU General Assembly , Vienna, Austria, April 2017
6. S. Merkel, C. Langrand, V. Svitlyk, G. Garbarino, A. Rosa, N. Hilaiet, Multigrain crystallography study of the effect of phase transformations on microstructures in deep Earth's mantle materials, ESRF User meeting, Grenoble, France, February 2017
7. S. Merkel, A. Lincot, R. Deguen, a. P. Cardin, A multiscale model of Earth's inner-core anisotropy, EGU General Assembly, Vienna, Austria, April 2016
8. Ph. Cardin, S. Merkel, A. Lincot, R. Deguen, A Multi-scale Self-consistent Model of Earth's Inner Core Anisotropy, AGU Fall meeting, San Francisco, CA, USA December 2015
9. S. Merkel, C. Langrand, N. Hilaiet, A. Rosa, Applications of multigrain crystallography for the study of post-perovskite microstructures, AGU Fall meeting, San Francisco, CA, USA, December 2015
10. S. Merkel, A. Lincot, C. Nisr, M. Hanfland, A. Zerr, Shear Deformation of Fe Polycrystals in the Rotational Diamond Anvil Cell, AGU Fall meeting, San Francisco, CA, United States, December 2014
11. A. D. Rosa, S. Merkel, S. Ghosh, N. Hilaiet, J. P. Perrillat, N. Mezouar, G. Vaughan, In situ 3D-X-ray diffraction tracking of individual grains of olivine during high-pressure/ high-temperature phase transitions, AGU Fall Meeting, San Francisco, CA, USA, December 2013
12. S. Merkel, C. Nisr, G. Vaughan, G. Ribarik, T. Ungar, P. Cordier, 3D X-Ray Diffraction in the Diamond Anvil Cell, EMC2012, Frankfurt, Germany, September 2012
13. S. Merkel, A. Lincot, P. Cardin, S. Petitgirard, H. P. Liermann, H. R. Wenk, Texture Memory in Iron: Application to Earth inner core, EMC2012, Frankfurt, Germany, September 2012
14. S. Merkel, C. Nisr, G. B. M. Vaughan, G. Ribárick, T. Ungár, P. Cordier, 3D X-Ray Diffraction and In-Situ Microstructural Studies in the Diamond Anvil Cell, Gordon Research Conference on Research at High Pressure, Biddeford, ME, USA, June 2012
15. S. Merkel, C. Nisr, G. Ribarik, T. Ungar, G. Vaughan, P. Cordier, A new method for the experimental study of dislocations in high pressure minerals, American Geophysical Union fall meeting, San Francisco, CA, USA, (2010)
16. S. Merkel, H.P. Liermann, L.M. Miyagi, H.R. Wenk, Plastic deformation of polycrystalline MgO up to 1250 K and 65 GPa, American Geophysical Union fall meeting, San Francisco, CA, USA, December 2009
17. S. Merkel, C.N. Tomé, H.R. Wenk, P. Cordier, Plasticity and stress in gold: application for high pressure experiments, European High Pressure Research Group, Paris, Septembre 2009
18. H. P. Liermann, S. Merkel, L. Miyagi, H.R. Wenk, G. Shen, H. Cynn, W.J. Ewans, In Situ Determination of BCC-, FCC- and HPC-Iron Textures at Simultaneous High- Pressure and –Temperature by Means of the Resistive Heated Radial Diffraction Diamond Anvil Cell (RH-RD-DAC): Implications for the iron core, American Geophysical Union fall meeting, San Francisco, CA, USA, 2008
19. S. Merkel, C.N. Tomé, H.-R. Wenk, Evaluation of stress in high pressure radial diffraction: application to hcp metals, American Geophysical Union fall meeting, San Francisco, CA, USA, 2007
20. S. Merkel, D. Antonangelli, G. Fiquet, T. Yagi, Ultrahigh pressure deformation of polycrystalline hcp-cobalt, American Geophysical Union fall meeting, San Francisco, CA, USA, 2003
21. S. Merkel, H.R. Wenk, P. Gillet, R.J. Hemley, and H.K. Mao , Deformation of silicate perovskite aggregates up to 30 GPa, American Geophysical Union fall meeting, San Francisco, CA, USA, 2002
22. S. Merkel, H.R. Wenk, G. Shen, J. Shu, P. Gillet, R.J. Hemley, H.K. Mao , Diamond anvil cell investigation of lattice strains and preferred orientation in iron at high pressure and temperature, American Geophysical Union fall meeting, San Francisco, CA, USA, 2001
23. S. Merkel S., Hemley, R.J., Mao, H.K., Goncharov, A.F, Wenk, H.R., and Gillet P. , Elasticity and preferred

- orientation in e-Fe under high pressure, European Union of Geosciences General Assembly, Strasbourg, France, 2001
24. S. Merkel, Somayazulu, M, Shu, J, Ma, YZ, Hemley, RJ, Gillet, P, Mao, HK , Elasticity and rheology of iron at high-pressure from radial x-ray diffraction, American Geophysical Union spring meeting, Washington, DC, USA, 2000
 25. S. Merkel, H.R. Wenk, J. Shu, H.K. Mao, R.J. Hemley, P. Gillet , High Pressure properties of FeS₂ pyrite, American Geophysical Union fall meeting, San Francisco, CA, USA, 1999
 26. S. Merkel, R.J. Hemley, H.K. Mao, Theoretical study of diamond deformation to multimegabar pressures, American Geophysical Union fall meeting, San Francisco, CA, USA, 1998

PUBLICATIONS

PEER-REVIEWED PUBLICATIONS IN INTERNATIONAL RESEARCH JOURNALS
58, 17 AS 1ST AUTHOR, 14 FROM SUPERVISED STUDENTS AND POST-DOCS

1. M. Saki, C. Thomas, S. Merkel, J. Wookey, Detecting seismic anisotropy above the 410 km discontinuity using reflection coefficients of underside reflections, *Physics of the Earth and Planetary Interiors*, **274**, 170–183 (2018) [doi: [10.1016/j.pepi.2017.12.001](https://doi.org/10.1016/j.pepi.2017.12.001)]
2. F. Lin, N. Hilaiet, P. Raterron, A. Addad, J. Immoor, H. Marquardt, C. N. Tomé, L. Miyagi, S. Merkel, Elasto-viscoplastic self consistent modeling of the ambient temperature plastic behavior of periclase deformed up to 5.4 GPa, *Journal of Applied Physics*, **122**, 205902 (2017) [doi: [10.1063/1.4999951](https://doi.org/10.1063/1.4999951)]
3. C. Langrand, N. Hilaiet, C. Nisr, M. Roskosz, G. Ribárik, G.B.M. Vaughan, S. Merkel, Reliability of Multigrain Indexing for Orthorhombic Polycrystals above 1 Mbar: Application to MgSiO₃-Post-Perovskite, *Journal of Applied Crystallography*, **50**, 120-130 (2017), [doi: [10.1107/S1600576716018057](https://doi.org/10.1107/S1600576716018057)]
4. A. D. Rosa, M. Merkulova, G. Garbarino, V. Svitlyk, J. Jacobs, C. Sahle, O. Mathon, M. Munoz, S. Merkel, Amorphous boron composite gaskets for in situ high pressure and high temperature studies, *High Pressure Research*, **36**, 564-574 (2016) [doi: [10.1080/08957959.2016.1245297](https://doi.org/10.1080/08957959.2016.1245297)]
5. A. D. Rosa, N. Hilaiet, S. Ghosh, J.-P. Perrillat, G. Garbarino, S. Merkel, Evolution of grain sizes and orientations during phase transitions in hydrous Mg₂SiO₄, *Journal of Geophysical Research: Solid Earth*, **121**, 7161–7176 (2016) [doi: [10.1002/2016JB013360](https://doi.org/10.1002/2016JB013360)]
6. B. Yue, F. Hong, S. Merkel, D. Tan, J. Yan, B. Chen, and H.-K. Mao, Deformation behavior across the zircon-scheelite phase transition, *Physical Review Letters*, **117**, 135701 (2016) [doi: [10.1103/PhysRevLett.117.135701](https://doi.org/10.1103/PhysRevLett.117.135701)]
7. C. Bollinger, P. Raterron, O. Castelnau, F. Detrez, S. Merkel, Textures in Deforming Forsterite Aggregates up to 8 GPa and 1673 K, *Physics and Chemistry of Minerals*, **43**, 409-417 (2016) [doi: [10.1007/s00269-016-0805-x](https://doi.org/10.1007/s00269-016-0805-x)]
8. A. Lincot, Ph. Cardin, R. Deguen, S. Merkel, Multiscale model of global inner-core anisotropy induced by hcp-alloy plasticity, *Geophysical Research Letters*, **43**, (2016) [doi: [10.1002/2015GL067019](https://doi.org/10.1002/2015GL067019)]
9. A. D. Rosa, N. Hilaiet, S. Ghosh, G. Garbarino, J. Jacobs, J.-P. Perrillat, G. Vaughan and S. Merkel, In situ monitoring of phase transformation microstructures at Earth's mantle pressure and temperature using multi-grain XRD, *Journal of Applied Crystallography*, **48**, 1346–1354 (2015) [doi: [10.1107/S1600576715012765](https://doi.org/10.1107/S1600576715012765)]
10. S. Merkel and N. Hilaiet, Multifit/Polydefix: a Framework for the Analysis of Polycrystal Deformation using X-Rays, *Journal of Applied Crystallography*, **48**, 1307–1313 (2015) [doi: [10.1107/S1600576715010390](https://doi.org/10.1107/S1600576715010390)]
11. F. Detrez, O. Castelnau, P. Cordier, S. Merkel, and P. Raterron, Effective viscoplastic behavior of polycrystalline aggregates lacking four independent slip systems inferred from homogenization methods; application to olivine, *Journal of the Mechanics and Physics of Solids*, **83**, 199–220 (2015), abstract [doi: [10.1016/j.jmps.2015.05.022](https://doi.org/10.1016/j.jmps.2015.05.022)]
12. A. Dewaele, C. Denoual, S. Anzellini, F. Occelli, M. Mezouar, P. Cordier, S. Merkel, M. Véron, and E. Rausch, Mechanism of the α - ϵ phase transformation in iron, *Physical Review B*, **91**, 174105 (2015) [doi: [10.1103/PhysRevB.91.174105](https://doi.org/10.1103/PhysRevB.91.174105)]
13. A. Lincot, S. Merkel, P. Cardin, Is inner core seismic anisotropy a marker for plastic flow of cubic iron?, *Geophysical Research Letters*, **42**, 1326–1333 (2015) [doi: [10.1002/2014GL062862](https://doi.org/10.1002/2014GL062862)]
14. C. Bollinger, S. Merkel, P. Cordier, P. Raterron, Deformation of Forsterite Polycrystals at Mantle Pressure: Comparison with Fe-Bearing Olivine and the Effect of Iron on its Plasticity, *Physics of the Earth and Planetary Interiors*, **240**, 95–104 (2015) [doi: [10.1016/j.pepi.2014.12.002](https://doi.org/10.1016/j.pepi.2014.12.002)]
15. A. Lincot, R. Deguen, S. Merkel, P. Cardin, Seismic response and anisotropy of a model hcp iron inner core, *Comptes Rendus Geoscience* **346** 148–157 (2014) [doi: [10.1016/j.crte.2014.04.001](https://doi.org/10.1016/j.crte.2014.04.001)]
16. C. Nisr, G. Ribárik, T. Ungár, G. B. M. Vaughan, S. Merkel, Three-dimensional X-ray diffraction in the diamond anvil cell: application to stishovite, *High Pressure Research* **34** 158–166 (2014) [doi: [10.1080/08957959.2014.885021](https://doi.org/10.1080/08957959.2014.885021)]
17. C. Bollinger, P. Raterron, P. Cordier, S. Merkel, Polycrystalline olivine rheology in dislocation creep: Revisiting experimental data to 8.1 GPa, *Physics of the Earth and Planetary Interiors* **228** 211–219 (2014) [doi: [10.1016/j.pepi.2013.12.001](https://doi.org/10.1016/j.pepi.2013.12.001)]
18. P. Raterron, F. Detrez, O. Castelnau, C. Bollinger, P. Cordier, S. Merkel, Multiscale modeling of upper mantle plasticity: From single-crystal rheology to multiphase aggregate deformation, *Physics of the Earth and Planetary Interiors* **228** 232–243 (2014) [doi: [10.1016/j.pepi.2013.11.012](https://doi.org/10.1016/j.pepi.2013.11.012)]
19. A. D. Rosa, C. Sanchez-valle, C. Nisr, S. R. Evans, R. Debord, S. Merkel, Shear wave anisotropy in textured phase D and constraints on deep water recycling in subduction zones, *Earth and Planetary Science Letters*, **377–378**, 13–22 (2013) [doi: [10.1016/j.epsl.2013.06.036](https://doi.org/10.1016/j.epsl.2013.06.036)]
20. A. Rothkirch, G. D. Gatta, M. Meyer, S. Merkel, M. Merlini, H. P. Liermann,, Single-crystal diffraction at the

- Extreme Conditions beamline P02.2: procedure for collecting and analyzing high-pressure single-crystal data, *Journal of Synchrotron Radiation*, **20**, 711–720, (2013) [[doi: 10.1107/S0909049513018621](https://doi.org/10.1107/S0909049513018621)]
21. S. Merkel, H. P. Liermann, L. Miyagi, H. R. Wenk, In situ radial X-ray diffraction study of texture and stress during phase transformations in bcc-, fcc- and hcp-iron up to 36 GPa and 1000 K, *Acta Materialia*, **61**, 5144–5151 (2013) [[doi: 10.1016/j.actamat.2013.04.068](https://doi.org/10.1016/j.actamat.2013.04.068)]
 22. P. Raterron, S. Merkel, and C. W. Holyoke, III., Axial temperature gradient and stress measurements in the deformation-DIA cell using alumina pistons, *Review of Scientific Instruments*, **84**, 043906 (2013) [[doi: 10.1063/1.4801956](https://doi.org/10.1063/1.4801956)]
 23. C. Bollinger, S. Merkel, P. Raterron, In situ quantitative analysis of stress and texture development in forsterite aggregates deformed at 6 GPa and 1373 K, *Journal of Applied Crystallography*, **45**, 263–271 (2012)[[doi: 10.1107/S002188981200516X](https://doi.org/10.1107/S002188981200516X)]
 24. C. Nisr, G. Ribárik, T. Ungár, G. B. M. Vaughan, P. Cordier, S. Merkel, High resolution three-dimensional X-ray diffraction study of dislocations in grains of MgGeO₃ post-perovskite at 90 GPa, *Journal of Geophysical Research*, **117**, B03201 (2012) [[doi: 10.1029/2011JB008401](https://doi.org/10.1029/2011JB008401)]
 25. S. Merkel, M. Gruson, Y. Wang, N. Nishiyama, C. N. Tomé, Texture and elastic strains in hcp-iron plastically deformed up to 17.5 GPa and 600 K: experiment and model, *Modelling and Simulation in Materials Science and Engineering*, **20**, 024005 (2012) [[doi: 10.1088/0965-0393/20/2/024005](https://doi.org/10.1088/0965-0393/20/2/024005)]
 26. N. Hilaret, Y. Wang, T. Sanehira, S. Merkel, S. Mei, Deformation of olivine under mantle conditions: An in situ high-pressure, high-temperature study using monochromatic synchrotron radiation, *Journal of Geophysical Research*, **117**, B01203 (2012) [[doi: 10.1029/2011JB008498](https://doi.org/10.1029/2011JB008498)]
 27. W. Kaniupanyacharoen, S. Merkel, L. Miyagi, P. Kaercher, C. N. Tomé, Y. Wang, H. R. Wenk, Significance of mechanical twinning in hexagonal metals at high pressure, *Acta Materialia*, **60**, 430–442 (2012) [[doi: 10.1016/j.actamat.2011.07.055](https://doi.org/10.1016/j.actamat.2011.07.055)]
 28. R. Deguen, P. Cardin, S. Merkel, R. A. Lebensohn, Texturing in Earth's inner core due to preferential growth in its equatorial belt, *Physics of the Earth and Planetary Interiors*, **188**, 173–184 (2011) [[doi: 10.1016/j.pepi.2011.08.008](https://doi.org/10.1016/j.pepi.2011.08.008)]
 29. K. Hirose, Y. Nagaya, S. Merkel, Y. Ohishi, Deformation of MnGeO₃ post-perovskite at lower mantle pressure and temperature, *Geophysical Research Letters*, **37**, L20302 (2010) [[doi: 10.1029/2010GL044977](https://doi.org/10.1029/2010GL044977)]
 30. O. Castelnau, P. Cordier, R. A. Lebensohn, S. Merkel, P. Raterron, Microstructures and rheology of the Earth's upper mantle inferred from a multiscale approach, *Comptes Rendus Physique*, **11**, 304–315 (2010) [[doi: 10.1016/j.crhy.2010.07.011](https://doi.org/10.1016/j.crhy.2010.07.011)]
 31. P. Raterron, S. Merkel, In situ rheological measurements at extreme P and T using synchrotron x-ray diffraction and radiography, *Journal of Synchrotron Radiation*, **16**, 748–756 (2009) [[doi: 10.1107/S0909049509034426](https://doi.org/10.1107/S0909049509034426)]
 32. H.P. Liermann, S. Merkel, L. Miyagi, H. R. Wenk, G. Shen, H. Cynn, W. J. Evans, Experimental method for in situ determination of material textures at simultaneous high pressure and high temperature by means of radial diffraction in the diamond anvil cell, *Review of Scientific Instruments*, **80**, 104501 (2009) [[doi: 10.1063/1.3236365](https://doi.org/10.1063/1.3236365)]
 33. S. Merkel, C. Tomé, H. R. Wenk, Modeling analysis of the influence of plasticity on high pressure deformation of hcp-Co, *Physical Review B*, **79**, 064110 (2009) [[doi: 10.1103/PhysRevB.79.064110](https://doi.org/10.1103/PhysRevB.79.064110)]
 34. L. Miyagi, S. Merkel, T. Yagi, N. Sata, Y. Ohishi and H.-R. Wenk, Diamond anvil cell deformation of CaSiO₃ perovskite up to 49 GPa, *Physics of the Earth and Planetary Interiors*, **174**, 159–164 (2009) [[doi: 10.1016/j.pepi.2008.05.018](https://doi.org/10.1016/j.pepi.2008.05.018)]
 35. S. Merkel, A. K. Mcnamara, A. Kubo, S. Speziale, L. Miyagi, Y. Meng, T. S. Duffy, and H.-R. Wenk, Deformation of (Mg,Fe)SiO₃ Post-Perovskite and D'' Anisotropy, *Science*, **316**, 1729–1732 (2007) [[doi: 10.1126/science.1140609](https://doi.org/10.1126/science.1140609)]
 36. N. Hilaret, B. Reynard, Y. Wang, I. Daniel, S. Merkel, N. Nishiyama, S. Petitgirard, High-pressure creep of serpentine, interseismic deformation, and initiation of subduction, *Science*, **318**, 1910–1913 (2007) [[doi: 10.1126/science.1148494](https://doi.org/10.1126/science.1148494)]
 37. K. Niwa, T. Yagi, K. Ohgushi, S. Merkel, N. Miyajima and T. Kikegawa, Lattice preferred orientation in CaIrO₃ perovskite and post-perovskite formed by plastic deformation under pressure, *Physics and Chemistry of Minerals*, **34**, 679–686 (2007) [[doi: 10.1007/s00269-007-0182-6](https://doi.org/10.1007/s00269-007-0182-6)]
 38. S. Merkel, A. Kubo, L. Miyagi, S. Speziale, T. S. Duffy, H.-K. Mao and H.-R. Wenk, Plastic Deformation of MgGeO₃ Post-Perovskite at Lower Mantle Pressures, *Science*, **311**, 644–646 (2006) [[doi: 10.1126/science.1121808](https://doi.org/10.1126/science.1121808)]
 39. S. Merkel, X-ray diffraction evaluation of stress in high pressure deformation experiments, *Journal of Physics: Condensed Matter*, **18**, S949–S962 (2006) [[doi: 10.1088/0953-8984/18/25/S03](https://doi.org/10.1088/0953-8984/18/25/S03)]
 40. S. Merkel, N. Miyajima, D. Antonangeli, G. Fiquet and T. Yagi, Lattice preferred orientation and stress in polycrystalline hcp-Co plastically deformed under high pressure, *Journal of Applied Physics*, **100**, 023510 (2006) [[doi: 10.1063/1.2214224](https://doi.org/10.1063/1.2214224)]
 41. S. Merkel and T. Yagi, Effect of lattice preferred orientation on lattice strains in polycrystalline materials

- deformed under high pressure: Application to hcp-Co, *Journal of Physics and Chemistry of Solids*, **67**, 2119–2131 (2006) [doi: [10.1016/j.jpcs.2006.05.025](https://doi.org/10.1016/j.jpcs.2006.05.025)]
42. D. Antonangeli, S. Merkel and D. L. Farber, Elastic anisotropy in hcp metals at high pressure and the sound wave anisotropy of the Earth's inner core, *Geophysical Research Letters*, **33**, L24303 (2006) [doi: [10.1029/2006GL028237](https://doi.org/10.1029/2006GL028237)]
 43. T. Ferroir, T. Yagi, T. Onozawa, S. Merkel, N. Miyajima, N. Nishiyama, T. Irifune, T. Kikegawa, Equation of state and phase transition in KAlSi_3O_8 hollandite at high pressure, *American Mineralogist*, **91**, 327–332 (2006) [doi: [10.2138/am.2006.1879](https://doi.org/10.2138/am.2006.1879)]
 44. L. Miyagi, S. Merkel, T. Yagi, N. Sata, Y. Ohishi and H.-R. Wenk, Quantitative Rietveld texture analysis of CaSiO_3 perovskite deformed in a diamond anvil cell, *Journal of Physics: Condensed Matter*, **18**, S995–S1005 (2006) [doi: [10.1088/0953-8984/18/25/S07](https://doi.org/10.1088/0953-8984/18/25/S07)]
 45. H-R Wenk, I Lonardelli, S Merkel, L Miyagi, J Pehl, S Speziale and C E Tommaseo, Deformation textures produced in diamond anvil experiments, analysed in radial diffraction geometry, *Journal of Physics: Condensed Matter*, **18**, S933–S947 (2006) [doi: [10.1088/0953-8984/18/25/S02](https://doi.org/10.1088/0953-8984/18/25/S02)]
 46. C.E. Tommaseo, J. Devine, S. Merkel, S. Speziale and H.-R. Wenk, Texture development and elastic stresses in magnesiowüstite at high pressure, *Physics and Chemistry of Minerals*, **33**, 84–97 (2006) [doi: [10.1007/s00269-005-0054-x](https://doi.org/10.1007/s00269-005-0054-x)]
 47. S. Merkel and T. Yagi, X-ray transparent gasket for diamond anvil cell high pressure experiments, *Review of Scientific Instruments*, **76**, 046109 (2005) [doi: [10.1063/1.1884195](https://doi.org/10.1063/1.1884195)]
 48. D. Antonangeli, M. Krisch, G. Fiquet, J. Badro, D. L. Farber, A. Bossak, and S. Merkel, Aggregate and single crystalline elasticity of hcp cobalt at high pressure, *Physical Review B*, **72**, 134303 (2005) [doi: [10.1103/PhysRevB.72.134303](https://doi.org/10.1103/PhysRevB.72.134303)]
 49. Y. Sueda, T. Irifune, N. Nishiyama, R.P. Rapp, T. Ferroir, T. Onozawa, T. Yagi, S. Merkel, N. Miyajima and K. Funakoshi, A new high-pressure form of KAlSi_3O_8 under lower mantle conditions, *Geophysical Research Letters*, **31**, L23612 (2004) [doi: [10.1029/2004GL021156](https://doi.org/10.1029/2004GL021156)]
 50. J. Chéry, S. Merkel and S. Bouissou, A physical basis for time clustering of large earthquakes, *Bulletin of the Seismological Society of America*, **91**, 1685–1693 (2001) [doi: [10.1785/0120000298](https://doi.org/10.1785/0120000298)]
 51. S. Merkel, J. Shu, P. Gillet, H.K. Mao and R.J. Hemley, X-ray diffraction study of the single crystal elastic moduli of ϵ -Fe up to 30 GPa, *Journal of Geophysical Research*, **110**, B05201 (2005) [doi: [10.1029/2004JB003197](https://doi.org/10.1029/2004JB003197)]
 52. S. Merkel, H.R. Wenk, P. Gillet, H.K. Mao and R.J. Hemley, Deformation of polycrystalline iron up to 30 GPa and 1000 K, *Physics of the Earth and Planetary Interiors*, **145**, 239–251 (2004) [doi: [10.1016/j.pepi.2004.04.001](https://doi.org/10.1016/j.pepi.2004.04.001)]
 53. S. Merkel, H.R. Wenk, J. Badro, G. Montagnac, P. Gillet, H.K. Mao, R.J. Hemley, Deformation of $(\text{Mg}_{0.9}\text{Fe}_{0.1})\text{SiO}_3$ perovskite aggregates up to 32 GPa, *Earth and Planetary Science Letters*, **209**, 351–360 (2003) [doi: [10.1016/S0012-821X\(03\)00098-0](https://doi.org/10.1016/S0012-821X(03)00098-0)]
 54. S. Merkel, H.R. Wenk, J. Shu, G. Shen, P. Gillet, H.K. Mao, and R.J. Hemley, Deformation of polycrystalline MgO at pressures of the lower mantle, *Journal of Geophysical Research*, **107**, 2271 (2002) [doi: [10.1029/2001JB000920](https://doi.org/10.1029/2001JB000920)]
 55. S. Merkel, A.P. Jephcoat, J. Shu, H.K. Mao, P. Gillet and R.J. Hemley, Equation of state, elasticity and shear strength of pyrite under high pressure, *Physics and Chemistry of Minerals*, **29**, 1–9 (2002) [doi: [10.1007/s002690100207](https://doi.org/10.1007/s002690100207)]
 56. S. Matthies, S. Merkel, H.R. Wenk, R.J. Hemley and H.K. Mao, Effects of texture on the determination of elasticity of polycrystalline e-iron from diffraction measurements, *Earth and Planetary Science Letters*, **194**, 201–212 (2001) [doi: [10.1016/S0012-821X\(01\)00547-7](https://doi.org/10.1016/S0012-821X(01)00547-7)]
 57. S. Merkel, A.F. Goncharov, H.K. Mao, P. Gillet and R.J. Hemley, Raman spectroscopy of Iron to 152 Gigapascals: Implications for Earth's Inner Core, *Science*, **288**, 1626–1629 (2000) [doi: [10.1126/science.288.5471.1626](https://doi.org/10.1126/science.288.5471.1626)]
 58. S. Merkel, R.J. Hemley and H.K. Mao, Finite-element modeling of diamond deformation at multimegabar pressures, *Applied Physics Letter*, **74**, 656–658 (1999) [doi: [10.1063/1.123031](https://doi.org/10.1063/1.123031)]

OTHER PUBLICATIONS: 11

1. S. Merkel, P. Cordier, Deformation of Core and Lower-Mantle Materials, in *Deep Earth: Physics and Chemistry of the Lower Mantle and Core* (eds H. Terasaki and R. A. Fischer), John Wiley & Sons, Inc, Hoboken, NJ (2016) Chap. 7, pp. 89-99 [doi: [10.1002/9781118992487.ch7](https://doi.org/10.1002/9781118992487.ch7)]
2. S. Merkel, Études Expérimentales de Plasticité aux Conditions de la Terre Profonde, Actes du Colloque Mécamat, Aussois, France (2015)
3. P. Cardin and S. Merkel, Earth's inner core, *Comptes rendus – Geoscience*, **346**, 99 (2014) [doi: [10.1016/j.crte.2014.07.001](https://doi.org/10.1016/j.crte.2014.07.001)]
4. S. Merkel, News & Views – Core processes: Earth's inner weakness, *Nature Geoscience*, **6**, 514–515 (2013) [doi: [10.1038/ngeo1861](https://doi.org/10.1038/ngeo1861)]

5. S. Merkel, Radial diffraction in the diamond anvil cell: methods and applications, in High-Pressure Crystallography: From Fundamental Phenomena to Technological Applications, E. Boldyreva and P. Dera (eds.), 111–122, Springer, Dordrecht, The Netherlands. (2010)
6. S. Merkel, Approche expérimentale de la plasticité sous haute pression, Habilitation à Diriger les Recherches, Université Lille 1, France, 323 p. (2009)
7. S. Merkel, Diffraction radiale en cellule diamant: contraintes et applications, Les verrous technologiques dans l'expérimentation haute pression, Réseau des hautes pressions du CNRS, 101–117 (2008)
8. P. Cordier, H. Couvy, S. Merkel and D. Weidner, Plastic deformation of minerals at high pressure: Experimental techniques, EMU Notes in Mineralogy, 7, Chapter 14 (2005)
9. S. Merkel, News&Views – The mantle deformed, *Nature*, **428**, 812–813 (2004) [[doi: 10.1038/428812a](https://doi.org/10.1038/428812a)]
10. S. Merkel, Élasticité et orientations préférentielles dans la Terre profonde: approche expérimentale, Thèse de doctorat, École Normale Supérieure de Lyon, 255 p. (2002)
11. S. Merkel, R.J. Hemley, H.K. Mao and D.M. Teter, Finite-element modeling and ab initio calculations of megabar stresses in the diamond anvil cell, Science and technology of high pressure, proceedings of the conference AIRAPT-XVII, edited by M.H. Maghnani W.J. Nellis and M.F. Nicol, 68–73, University Press (India) Limited (2000)