Corentin Chatelier

Post-doctoral researcher
PhD in Materials Science

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29 years old

Work Experience

2021 – in progress **Post-doctoral researcher**, *CEA – IRIG*, Grenoble, France
Modeling and Exploration of Materials Laboratory, Nanostructures and X-Rays team. Part of ERC Project "Coherent diffraction for a look inside nanostructures towards atomic resolution: catalysis and interface" of Dr. Marie-Ingrid Richard. Combination of different techniques for the study of Pt, Pd and Ni nanocatalysts: *ex situ*, *in situ* and *operando* Bragg Coherent X-ray Diffraction Imaging, coupled DFT, MS and MD simulations.

2017 – 2020 **PhD student**, *CNRS – Institut Jean Lamour – Synchrotron SOLEIL*, Nancy – Gif-sur-Yvette, France
PhD thesis entitled *On the surface structure and catalytic properties of Al-based intermetallics*, supervised by Pr. Émilie Gaudry (IJL) et Dr. Alessandro Coati (SOLEIL). Combination of different techniques : heterogeneous catalysis (hydrogenation reaction), surface X-ray diffraction, scanning tunneling microscopy, DFT calculations, thermodynamic and microkinetic simulations.

2016 – 2017 **Teaching assistant**, *Department of Chemical and Materials Engineering*, *University of Alberta*, Edmonton, AB, Canada
Teaching assistant for the lab sessions of the *Materials Science II* courses (MAT E 202, BSc level).

2015 – 2017 **Research assistant**, *Advanced Materials and Processing Laboratory (AMPL)*, *University of Alberta*, Edmonton, AB, Canada
MSc thesis entitled *Precipitation Analysis in Microalloyed X70 Steels and Heat Treated L80 and T95 Steels* supervised by Pr. Hani Henein and Pr. Douglas Ivey. Working on nanoscale precipitation analysis in microalloyed steels using quantitative x-ray diffraction and electron microscopy combined with numerical simulations.

Summer 2015 **Research intern**, *European Synchrotron Radiation Facility (ESRF)*, Grenoble, France
Research internship at Beamline ID03 (Surface X-ray Diffraction), supervised by Dr. Roberto Felici. Continuation of the IJL project.

2014 – 2015 **Research trainee**, *Institut Jean Lamour (IJL)*, Nancy, France
One-year research project (one day a week) entitled *Study of the (100) surface structure of quasicrystaline approximant o-$Al_{13}Co_4$ using surface X-ray diffraction*, supervised by Pr. Émilie Gaudry.

Education

2017 – 2020 **Université de Lorraine, PhD School C2MP – Institut Jean Lamour – Synchrotron SOLEIL**, *Chemistry and Physics of Solids and Surfaces Department – Surfaces Interfaces X-ray Scattering Beamline*, PhD Student in Materials Sciences, Nancy – Gif-sur-Yvette, France
PhD position cosupervised by Pr. Émilie Gaudry (IJL) and Dr. Alessandro Coati (SOLEIL). Participation to different international schools : Higher European Research Courses for Users of Large Experimental Systems (HERCULES 2018), Paris International School on Advanced Computational Materials Sciences (PISACMS 2018), International School on Aperiodic Crystals (ISAC4)

2015 – 2017 **University of Alberta**, *Department of Chemical and Materials Engineering*, Master of Science en Ingénierie des Matériaux, Edmonton, AB, Canada
Dual Degree program Mines Nancy/University of Alberta with courseworks focused on thermodynamics, computational materials science and physical and mathematical modelling of materials processing.

2013 – 2017 **École Nationale Supérieure des Mines de Nancy**, *Engineering School*, Formation Ingénieur Civil des Mines, Nancy, France
Engineering Student – Major in Materials Sciences and Engineering with courseworks focused on crystallography, solid state physics, quantum mechanics, statistical and atomic physics – Bachelor's Degree in Engineering Sciences.

2011 – 2013 **Classe Préparatoire aux Grandes Écoles**, *Lycée du Parc*, Lyon, France
Two-year intensive preparatory courses for a national competitive examination in a wide range of subjects including Mathematics, Physics and Chemistry (PCSI and PC*).

Special skills

Technical SXRD, DFT, MD, SEM, STM, Bragg CDI, Catalysis
Computer LaTeX, Python, VASP, LAMMPS, BINocculars, PyNX, Anarod, Ovito, Matlab, Office, Unix
English Fluent
German Conversational (Goethe Zertifikat B2 in June 2015)

Awards

August 2022 **Best Poster Presentation Award**, *International Union of Crystallography*, Versailles, France
Awarded every two years in recognition of the best poster presentation in applied crystallography by the IUCr during the *33rd European Crystallographic Meeting* (Versailles, France) of the European Crystallographic Association.

May 2022 **PhD Thesis Award**, *French Association of Crystallography*, France
Awarded every two years in recognition of the best PhD thesis by the French Association of Crystallography ("physics" thematic group).

December 2021 **PhD Thesis Award**, *Université de Lorraine*, Nancy, France
Awarded annually in recognition of the best PhD thesis by the doctoral school C2MP of Université de Lorraine.

January 2020 **Best Poster Presentation Award**, *Sorbonne University*, Paris, France
Awarded annually in recognition of the best poster presentation during the *Surface and Interface Days*.

December 2019 **Best Poster Presentation Award**, *Institut Jean Lamour*, Nancy, France
Awarded annually in recognition of the best poster presentation during the *Institut Jean Lamour Science Day*.

December 2018 **Best Oral Presentation Award**, *European Integrated Center for the Development of Metallic Alloys and Compounds*, Poznan, Poland
Awarded annually in recognition of the best oral presentation during the *ECMetAC Days*.

December 2015 **Captain Thomas Farrell Greenhalgh Memorial Scholarship**, *University of Alberta, Department of Chemical and Materials Engineering*, Edmonton, AB, Canada
Awarded annually to students with superior academic achievement. Recipients are selected on the basis of leadership qualities, and contributions made to extracurricular and/or community activities.

Publications

[16] Marie-Ingrid Richard, Isaac Martens, Maxime Dupraz, Jakub Drnec, Veijo Honkimäki, **Corentin Chatelier**, Clément Atlan, Marta Mirolo, Mor Levi, Eugen Rabkin, Joël Eymery, Akshata Naidu, Tobias U. Schülli, and Steven J. Leake. Taking bragg coherent diffraction imaging to higher energies at fourth generation synchrotrons: Nanoscale characterization. *ACS Applied Nano Materials*, 6(12):10246–10255, 2023.

[15] Clément Atlan, **Corentin Chatelier**, Maxime Dupraz, Isaac Martens, Arnaud Viola, Ni Li, Lu Gao, Steven Leake, Tobias Schulli, Joël eymery, Frédéric Maillard, and Marie-Ingrid Richard. Imaging the strain evolution of a platinum nanoparticle under electrochemical control. *Nature Materials*, 2023.

[14] **Corentin Chatelier**, Kanika Anand, Peter Gille, Marie-Cécile de Weerd, Julian Ledieu, Vincent Fournée, Andrea Resta, Alina Vlad, Yves Garreau, Alessandro Coati, and Émilie Gaudry. Revealing the epitaxial interface between $Al_{13}Fe_2$ and Al_5Fe_2 enabling atomic Al interdiffusion. *ACS Applied Materials and Interfaces*, 15(15):19593–19603, 2023.

[13] David Simonne, Jérôme Carnis, Cément Atlan, **Corentin Chatelier**, Vincent Favre-Nicolin, Maxime Dupraz, Steven J. Leake, Andrea Resta, Alessandro Coati, and Marie-Ingrid Richard. Gwaihir: Jupyter Notebook graphical user interface for Bragg Coherent Diffraction Imaging. *Journal of Applied Crystallography*, 55(4):1045–1054, 2022.

[12] Maxime Dupraz, Ni Li, Jérôme Carnis, Longfei Wu, Stéphane Labat, **Corentin Chatelier**, Rim van de Poll, Jan P. Hofmann, Ehud Almog, Steven J. Leake, Yves Watier, Sergey Lazarev, Fabian Westermeier, Michael Sprung, Emiel J. M. Hensen, Olivier Thomas, Eugen Rabkin, and Marie-Ingrid Richard. Imaging the facet surface strain state of supported multi-faceted Pt nanoparticles during reaction. *Nature Communications*, 13(1):3003, 2022.

[11] Thiago Trevizam Dorini, Florian Brix, **Corentin Chatelier**, Anton Kokalj, and Émilie Gaudry. Two-dimensional oxide quasicrystal approximants with tunable electronic and magnetic properties. *Nanoscale*, 13:10771–10779, 2021.

[10] **Corentin Chatelier**. *On the surface structures and catalytic properties of Al-based intermetallics*. PhD thesis, Université de Lorraine, 2021.

[9] Andrea Resta, Uta Hejral, Sara Blomberg, Stefano Albertin, Alina Vlad, Yves Garreau, **Corentin Chatelier**, Federica Venturini, Pilar Ferrer-Escorihuela, Georg Held, Dave Grinter, Edvin Lundgren, and Alessandro Coati. Ammonia oxidation over a $Pt_{25}Rh_{75}(001)$ model catalyst surface: an operando study. *The Journal of Physical Chemistry C*, 124(40):22192–22199, 2020.

[8] **Corentin Chatelier**, Yves Garreau, Alina Vlad, Julian Ledieu, Andrea Resta, Vincent Fournée, Marie-Cécile de Weerd, Alessandro Coati, and Émilie Gaudry. Pseudo-2-fold surface of the $Al_{13}Co_4$ catalyst: structure, stability, and hydrogen adsorption. *ACS Applied Materials and Interfaces*, 12(35):39787–39797, 2020.

[7] Émilie Gaudry, **Corentin Chatelier**, David Loffreda, Dmytro Kandaskalov, Alessandro Coati, and Laurent Piccolo. Catalytic activation of a non-noble intermetallic surface through nanostructuration under hydrogenation conditions revealed by atomistic thermodynamics. *Journal of Materials Chemistry A*, 8:7422–7431, 2020.

[6] **Corentin Chatelier**, Yves Garreau, Laurent Piccolo, Alina Vlad, Andrea Resta, Julian Ledieu, Vincent Fournée, Marie-Cécile de Weerd, Frédéric-Emmanuel Picca, Marc de Boissieu, Roberto Felici, Alessandro Coati, and Émilie Gaudry. From the Surface Structure to Catalytic Properties of $Al_5Co_2(2\bar{1}0)$: A Study Combining Experimental and Theoretical Approaches. *The Journal of Physical Chemistry C*, 124(8):4552–4562, 2020.

[5] Laurent Piccolo, **Corentin Chatelier**, Marie-Cécile de Weerd, Franck Morfin, Julian Ledieu, Vincent Fournée, Peter Gille, and Émilie Gaudry. Catalytic properties of $Al_{13}TM_4$ complex intermetallics: influence of the transition metal and the surface orientation on butadiene hydrogenation. *Science and Technology of Advanced Materials*, 20(1):557–567, 2019.

[4] Philippe Scheid, **Corentin Chatelier**, Julian Ledieu, Vincent Fournée, and Émilie Gaudry. Bonding network and stability of clusters: the case study of the $Al_{13}TM_4$ pseudo-10fold surfaces. *Acta Crystallographica Section A: Foundations and Advances*, 75(2):314–324, 2019.

[3] **Corentin Chatelier**, J. Barry Wiskel, Douglas G. Ivey, and Hani Henein. The Effect of Skelp Thickness on Precipitate Size and Morphology for X70 Microalloyed Steel Using Rietveld Refinement (Quantitative X-ray Diffraction). *Crystals*, 8(7):287, 2018.

[2] **Corentin Chatelier**. Precipitation Analysis in Microalloyed X70 Steels and Heat Treated L80 and T95 Steels. Master's thesis, University of Alberta, 2017.

[1] Émilie Gaudry, **Corentin Chatelier**, Gary M. McGuirk, Laura N. Serkovic-Loli, Marie-Cécile de Weerd, Julian Ledieu, Vincent Fournée, Roberto Felici, Jakub Drnec, Guillaume Beutier, and Marc de Boissieu. Structure of the $Al_{13}Co_4(100)$ surface: Combination of surface x-ray diffraction and ab initio calculations. *Physical Review B*, 94(16):165406, 2016.

Oral Presentations

March 2023 — **Corentin Chatelier**, Clément Atlan, Maxime Dupraz, David Simonne, Stéphane Labat, Tobias Schulli, Steven Leake, Joël Eymery and Marie-Ingrid Richard

"Ni-rich nanoparticles in the light of Bragg CDI : CO_2 adsorption and core-shell volume transition"

TMS2023, The Minerals, Materials and Metals Society Annual Meeting, San Diego, California, USA.

January 2023 — **Corentin Chatelier**

"Atoms to catalysis : a subtle mix of X-rays and quantum chemistry"

Invited at Synchrotron SOLEIL (Saclay, France) to give a seminar to the SOLEIL research community.

September 2019 — **Corentin Chatelier**, Laurent Piccolo, Marie-Cécile de Weerd, Franck Morfin, Julian Ledieu, Vincent Fournée, Peter Gille and Émilie Gaudry

"Catalytic properties of $Al_{13}TM_4$ complex intermetallics: influence of the transition metal and the surface orientation on butadiene hydrogenation"

IMCAT 2019, International Symposium on Intermetallic Compounds in Catalysis, Chemnitz, Germany.

Decembrer 2018 — **Corentin Chatelier**, Yves Garreau, Vincent Fournée, Julian Ledieu, Marie-Cécile de Weerd, Alina Vlad, Andrea Resta, Laurent Piccolo, Marc de Boissieu, Roberto Felici, Alessandro Coati and Émilie Gaudry

"Al-based intermetallics as catalysts for hydrogenation: the case study of $Al_5Co_2(2\bar{1}0)$"

ECMetAC Days 2018, International Symposium on the Development of New Metallic Alloys and Compounds, Poznan, Poland.

Posters

[5] – 2022 **Corentin Chatelier**, Clément Atlan, Maxime Dupraz, Ni Li, Eugen Rabkin, Stéphane Labat, Joël Eymery, and Marie-Ingrid Richard. In situ 3D observations of a core-shell volume transition in a Ni_3Fe nanocrystal using BCDI. Présenté à :

1. *33rd European Crystallographic Meeting*, Versailles, France. Août 2022.
2. *GDR CohereX*, Marseille, France. Juin 2022.

[4] – 2021 **Corentin Chatelier**, Maxime Dupraz, Ni Li, Clément Atlan, Eugen Rabkin, Stéphane Labat, Joël Eymery, and Marie-Ingrid Richard. 3D Imaging of a Core-Shell Volume Transition in a Ni_3Fe Nanoparticle. Présenté à :

1. *Rayons X et Matière 2021*, Aix-en-Provence, France. Novembre 2021.
2. *Congrès de l'Association Française de Cristallographie 2021*, on-line, Grenoble, France. Juillet 2021.

[3] – 2020 **Corentin Chatelier**, Yves Garreau, Alina Vlad, Andrea Resta, Vincent Fournée, Julian Ledieu, Marie-Cécile de Weerd, Alessandro Coati, and Émilie Gaudry. Surface Structure investigations of $Al_{13}Co_4(010)$ Catalyst using a Combination of Surface Science Techniques and *ab initio* Calculations. Présenté à :

1. *Journée Surfaces et Interfaces 2020*, Sorbonnes Universités, Paris, France. Janvier 2020.
2. *SOLEIL Users Meeting*, SOLEIL, Gif-sur-Yvette, France. Janvier 2020.
3. *Journée Scientifique de l'IJL 2019*, Institut Jean Lamour, Nancy, France. Décembre 2019.
4. *ECMetAC Days 2019*, Max-Planck-Institut, Dresde, Allemagne. Décembre 2019.

[2] – 2019 **Corentin Chatelier**, Yves Garreau, Vincent Fournée, Julian Ledieu, Marie-Cécile de Weerd, Alina Vlad, Andrea Resta, Laurent Piccolo, Marc de Boissieu, Roberto Felici, Alessandro Coati, and Émilie Gaudry. Structure and Reactivity of $Al_5Co_2(2\bar{1}0)$: Combination of SXRD and DFT Calculations. Présenté à :

1. *International School on Aperiodic Crystals (ISAC)*, Portbail, France. Septembre 2019.
2. *Journée Surfaces et Interfaces 2019*, Institut Jean Lamour, Nancy, France. Janvier 2019.

[1] – 2018 **Corentin Chatelier**, Yves Garreau, Vincent Fournée, Julian Ledieu, Marie-Cécile de Weerd, Alina Vlad, Andrea Resta, Laurent Piccolo, Marc de Boissieu, Roberto Felici, Alessandro Coati, and Émilie Gaudry. Complex Intermetallic Compounds : Surface Structure and Reactivity. Présenté à :

1. *Paris International School on Advanced Computational Materials Science (PISACMS 2018)*, Sorbonnes Universités, Paris, France. Août 2018.
2. *Journée Scientifique et Technique de SOLEIL 2018*, SOLEIL, Gif-sur-Yvette, France. Juin 2018.
3. *Higher European Research Courses for Users of Large Experimental Systems (HERCULES 2018)*, European Synchrotron Radiation Facility (ESRF), Grenoble, France. Février-Mars 2018.

Interests

Arts Violin (19 years of practice), guitar, bass guitar, drums
⋆ First violin in *La Petite Philharmonie* orchestra (2021–2023)
⋆ Second violin in the *Orchestre Symphonique du Campus d'Orsay* (2018–2020)
⋆ Second violin in the *University of Alberta Symphony Orchestra* (2015–2017)
⋆ Principal second violin in the *Orchestre Symphonique Universitaire de Lorraine* (2013–2015)
Photography

Sports Hiking, Skiing, Badminton

Memberships and Miscellaneous Information

2021 Qualified in Section 33 by the *National Council of Universities* (Chemistry of materials)

2021 Member of the *French Association of Crystallography* (AFC)

Depuis 2017 Member of *Mines Nancy Alumni* association

References

Dr. Marie-Ingrid Richard
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Dr. Joël Eymery
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Dr. Roberto Felici
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