

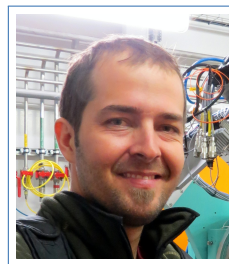
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Citizenship

Canadian and Czech (EU) Citizen

Language proficiency

Czech (native), English (fluent), French (working knowledge)

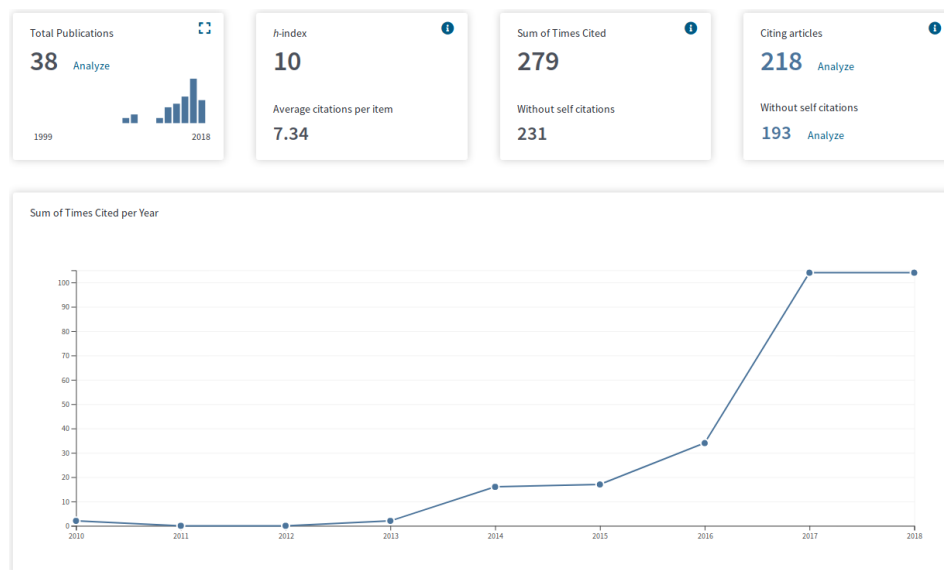
Highlights

- Lead scientist for research projects related to fuel cell electrocatalysis and materials research.
- Expert knowledge of electrochemical systems used for energy conversion and storage.
- Expert knowledge in advanced synchrotron based X-ray scattering techniques used for in-situ and operando catalysis research on single crystals, thin films and polycrystalline materials.
- Expert knowledge of X-ray instrumentation and synchrotron beamline design.
- Expert knowledge of electron spectroscopy and diffraction.
- Extensive teaching and mentoring experience.

Research interests

Surface science, Electrochemistry, Energy systems, Fuel cells, Energy production, Energy storage, Batteries, Heterogeneous catalysis, Bonding vs. structure for monoatomic layers, 2D materials, Underpotential deposition (UPD), UHV instrumentation, X-ray instrumentation, Synchrotron radiation based X-ray scattering techniques, Advanced materials, Graphene, Quantum modeling, Complex systems and complexity,

Citation Metrics



www.webofknowledge.com, accessed October 16th 2018

Experience

Research Positions

- 2018–present **Beamline Responsible (ID03 beamline)**, *European Synchrotron Radiation Facility (ESRF)*, Grenoble, France.
- Supervision of beamline operation and scientific outcome (1 postdoc, 2 junior scientists, 1 beamline manager and 1 technician).
- 2015–present **Beamline Scientist (ID31 beamline)**, *European Synchrotron Radiation Facility (ESRF)*, Grenoble, France.
- In-situ investigations of Pt electrooxidation (lead scientist): Management of an international team of scientist (senior and junior), design of the experiments, decisions about the future direction of the research, publication of the results.
 - Tomography of low temperature fuel cell in operando conditions (lead scientist): Formulation of the scientific questions, design of the fuel cell according to industrial standards to be used for X-ray tomography, management of small team of students and scientist, design of the experiments and data analysis strategies.
 - Development of new operando hard X-ray surface diffraction techniques (lead scientist): Development of instrumentation and electrochemical cells, students supervision, publication of the results.
 - Study of the role of defects in oxygen reduction electrocatalysis: Responsible for operando experiments using X-ray probe: design, preparation, data analysis and interpretation.

- Si insertion anodes for Li-ion batteries: Operando studies of Si anodes during Li insertion, project in preparation phase.
 - Development of beamline data analysis pipeline: Architecture and software development together with the team of engineers.
 - **Technical duties:** Beamline instrument maintenance and development, Beamline user support
- 2013–2015 **Junior Beamline Scientist (ID03 beamline)**, *European Synchrotron Radiation Facility (ESRF)*, Grenoble, France.
- In-situ investigations of Pt electrooxidation (lead scientist): Created a research idea, developed experimental methodologies (XRR, SXRD, GISAXS, CV, Potential step), organized a research team, co-developed atomistic model of Pt oxidation and degradation of Pt based fuel cell catalysts, published the results.
 - Investigation of graphene based magnetic heterostructures (lead scientist): Designed the experiments, decided about the used characterization techniques (XPS, MOKE, LEED, XRR, SXRD), managed a senior and junior scientists team for data acquisition and analysis (3 students, MSc thesis), published the results.
 - Development of Pt electrocatalyst supported on graphene/Iridium heterostructure (lead scientist): Formulated the scientific problem, designed the experiments and made decision about the used techniques (XPS, LEED, CV), managed MSc student, publication of the results in preparation.
 - **Technical duties:** Beamline instrument maintenance and development, Beamline user support
- 2011–2013 **Postdoctoral Fellow (ID03 beamline)**, *European Synchrotron Radiation Facility (ESRF)*, Grenoble, France.
- Stability of bimetallic Pt based ORR catalysts (lead scientist): Formulated the scientific problem, designed the experiments and decided about used techniques (XRR, SXRD, GISAXS, CV, Potential step), developed new experimental approaches, managed team of senior and junior scientists, published the results.
 - Development of advanced SXRD data analysis techniques (lead scientist): Developed the theory and methodology, helped with software development, deployed functional software (BINoculars), managed PhD student, published the results.
 - Structural and Electronic Reconstructions at the LaAlO₃/SrTiO₃ Interface: Responsible for experiment preparation, data analysis.
 - **Technical duties:** Beamline instrument maintenance and development, Beamline user support

Teaching Positions

- 2014 **Invited lecturer**, *Charles University, Physics Department*, Prague, Czech Republic, Electrochemistry for physics postgraduate students.
30 students
- 2010 **Chemistry Instructor**, *Camosun College*, Victoria BC, Canada, General chemistry.
60 students in lectures (200 hrs), 120 students in labs (400 hrs).
- 2004–2010 **Teaching assistant**, *University of Victoria, Chemistry Department*, Victoria BC, Canada, Physical Chemistry, General chemistry for engineers.
19 sections (15 students per section), 98 hrs per section.

Other teaching experience

- 2011-present **Postgraduate co-supervisor**.
3 PhD students, 4 MSc students.
- 2011-present **Undergraduate mentor**.
5 students.
- 2004-2010 **Chemistry and Physics Tutor**, General Chemistry, Physical Chemistry, Quantum Physics and Chemistry.
10 university students.

Education

- 2004–2010 **PhD, Chemistry**, *University of Victoria*, Victoria BC, Canada.
Title of dissertation: Surface science of Cs, CsO and CsI ionic layers on Pt(111).
- 1998–2003 **MSc, Physics**, *Charles University*, Prague, Czech Republic.
Title of thesis: Preparation of thin NEG layers and their study by SIMS and XPS. (UHV pumping coatings for particle accelerators)

Technical skills

- Detailed knowledge of x-ray diffraction and spectroscopy techniques (XRD, SXRD, GISAXS, XRR, HAXPES, EXAFS, XANES, Coherent Imaging, Real space diffraction imaging)
- In-depth experience with Ultra High Vacuum (UHV) characterization and preparation techniques (XPS, ARXPS, AES, UPS, TDS, LEED, SIMS, Kelvin probe, magnetron sputtering).
- Expert knowledge of Electrochemistry and Electrochemical methods (CV, EIS, Chronoamperometry, RDE).
- Expert knowledge of gas phase catalysis.
- Extensive knowledge of magnetic measurements of thin layers (SMOKE)

- Experience with scanning probe microscopy (STM, AFM)
- Experience with electron microscopy (SEM)
- 6 years in-depth experience with synchrotron X-ray instrumentation and design of the beamline components
- Excellent knowledge of UHV instruments, vacuum technology and physics.
- Maintenance and design of X-ray, UHV and electrochemical instruments.
- Troubleshooting, design and manufacturing of electronic circuits (PCB and CAD experience).
- Development of data analysis procedures and data acquisition software (Python, C++, Visual Basic, Origin).
- Expert knowledge of data analysis software for X-ray diffraction (FullProf, GSASII, GenX, IsGISAXS, pyFAI, SAXSUtilities)
- Development of theoretical models using Python, C++ and Maple.
- Four years experience with quantum modeling of solid surfaces.

Professional affiliations

- The Electrochemical Society (ECS)
- The International Society of Electrochemistry (ISE)

Other Activities

- 2016–present **Chemistry bridge coordinator**, *European Synchrotron Radiation Facility (ESRF)*, Grenoble, France.
- Coordination of chemistry activities across ESRF.
 - Organization of topical chemistry symposia.
 - Coordination of Grenoble wide battery knowledge network (CEA, University of Grenoble, CNRS, ILL, ESRF).
- 2012–present **Guide**, *European Synchrotron Radiation Facility (ESRF)*, Grenoble, France.
Lectures and tours for general public.
- 2007–present **Director and founder**, *BC Creek Protection Society*, Victoria BC, Canada.
Watchdog for renewable energy deployment in British Columbia.
- 2006–2009 **Volunteer**, *Scientists in School*, Victoria BC, Canada.
Organizing and supervising basic chemistry experiments for children ranging from kindergarten to grade 8.
- 2003–2004 **Electrician**, *Javelin Industrial*, Victoria BC, Canada.
Hardware setup for phone and network systems.

1997–2003 **Outdoor guide**, CVOK, Pardubice, Czech Republic.

Publications

2009

- [1] **Drnec, J.**, Harrington, D. A. **2009**, “Anomalous adsorption of Cs on Pt(111)”, *Surf. Sci.*, *603*, 2005–2014.

2010

- [2] **Drnec, J.**, Harrington, D. A. **2010**, “Electrochemical Study of Pt(111)-Cs Surfaces Prepared in Ultra-High Vacuum”, *ECS Trans.*, *28*, 47–55.
- [3] **Drnec, J.**, Harrington, D. A. **2010**, “Coadsorption of cesium and iodine on Pt(111): Structure and ionicity”, *Surf. Sci.*, *604*, 2106–2115.

2013

- [4] Salluzzo, M., Gariglio, S., Torrelles, X., Ristic, Z., Di Capua, R., **Drnec, J.**, Sala, M. M., Ghiringhelli, G., Felici, R., Brookes, N. B. **2013**, “Structural and electronic reconstructions at the LaAlO₃/ SrTiO₃ Interface”, *Adv. Mater.*, *25*, 2333–2338.

2014

- [5] **Drnec, J.**, Zhou, T., Pintea, S., Onderwaater, W., Vlieg, E., Renaud, G., Felici, R. **2014**, “Integration techniques for surface X-ray diffraction data obtained with a two-dimensional detector”, *J. Appl. Crystallogr.*, *47*, 365–377.
- [6] De Poel, W., Pintea, S., De Jong, A., **Drnec, J.**, Carlà, F., Felici, R., Op Den Camp, H., Elemans, J. A., Van Enkevort, W. J., Rowan, A. E., Vlieg, E. **2014**, “Dibenzo crown ether layer formation on muscovite mica”, *Langmuir*, *30*, 12570–12577.
- [7] De Poel, W., Pintea, S., **Drnec, J.**, Carla, F., Felici, R., Mulder, P., Elemans, J. A., Van Enkevort, W. J., Rowan, A. E., Vlieg, E. **2014**, “Muscovite mica: Flatter than a pancake”, *Surf. Sci.*, *619*, 19–24.
- [8] **Drnec, J.**, Harrington, D. A. **2014**, “Oxygen and iodine adsorption on cesium-precovered Pt(111)”, *Surf. Sci.*, *630*, 9–15.

2015

- [9] Lorch, C., Banerjee, R., Dieterle, J., Hinderhofer, A., Gerlach, A., **Drnec, J.**, Schreiber, F. **2015**, “Templating Effects of α -Sexithiophene in Donor-Acceptor Organic Thin Films”, *J. Phys. Chem. C*, *119*, 23211–23220.
- [10] Roobol, S., Onderwaater, W., **Drnec, J.**, Felici, R., Frenken, J. **2015**, “BINoculars: Data reduction and analysis software for two-dimensional detectors in surface X-ray diffraction”, *J. Appl. Crystallogr.*, *48*, 1324–1329.

- [11] Banerjee, R., Novák, J., Frank, C., Girleanu, M., Ersen, O., Brinkmann, M., Anger, F., Lorch, C., Dieterle, J., Gerlach, a., **Drnec, J.**, Yu, S., Schreiber, F. **2015**, “Structure and Morphology of Organic Semiconductor-Nanoparticle Hybrids Prepared by Soft Deposition”, *J. Phys. Chem. C*, *119*, 5225–5237.
- [12] **Drnec, J.**, Vlačić, S., Carlomagno, I., Gonzalez, C. J., Isern, H., Carlà, F., Fiala, R., Rougemaille, N., Coraux, J., Felici, R. **2015**, “Surface alloying upon Co intercalation between graphene and Ir(111)”, *Carbon*, *94*, 554–559.
- [13] **Drnec, J.**, Bizzotto, D., Carlà, F., Fiala, R., Sode, A., Balmes, O., Detlefs, B., Dufrane, T., Felici, R. **2015**, “An in-situ X-ray diffraction study on the electrochemical formation of PtZn alloys on Pt(111) single crystal electrode”, *Appl. Surf. Sci.*, *354*, 443–449.

2016

- [14] Gaudry, Chatelier, C., McGuirk, G. M., Serkovic Loli, L. N., De Weerd, M. C., Ledieu, J., Fournée, V., Felici, R., **Drnec, J.**, Beutier, G., De Boissieu, M. **2016**, “Structure of the Al₁₃Co₄ (100) surface: Combination of surface x-ray diffraction and ab initio calculations”, *Phys. Rev. B*, *94*, 165406.
- [15] Carlomagno, I., **Drnec, J.**, Scaparro, A. M., Cicia, S., Vlačić, S., Felici, R., Meneghini, C. **2016**, “Co-Ir interface alloying induced by thermal annealing”, *J. Appl. Phys.*, *120*, 195302.
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- [22] **Drnec, J.**, Ruge, M., Reikowski, F., Rahn, B., Carlà, F., Felici, R., Stettner, J., Magnussen, O. O. M., Harrington, D. D. A. **2017**, “Pt oxide and oxygen reduction at Pt(111) studied by surface X-ray diffraction”, *Electrochem. commun.*, *84*, 50–52.
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- [33] Reikowski, F., Wiegmann, T., Stettner, J., **Drnec, J.**, Honkimäki, V., Maroun, F., Allongue, P., Magnussen, O. M. **2017**, “Transmission Surface Diffraction for Operando Studies of Heterogeneous Interfaces”, *J. Phys. Chem. Lett.*, *8*, 1067–1071.
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- [36] Matras, D., Jacques, S. D. M., Godini, H. R., Khadivi, M., **Drnec, J.**, Poulain, A., Cernik, R. J., Beale, A. M. **2018**, “Real-Time Operando Diffraction Imaging of La-Sr/CaO during the Oxidative Coupling of Methane”, *J. Phys. Chem. C*, *122*, 2221–2230.
- [37] **Drnec, J.**, Stickney, J., Harrington, D. **2018**, “From Salt to Germanene : A Cookbook for Electrochemical Formation of 2D Materials”, *ECS Trans.*, *85*, 31–40.
- [38] Carlomagno, I., **Drnec, J.**, Vlačić, S., Vinogradov, N., Carlà, F., Isern, H., Meneghini, C., Felici, R. **2018**, “Co film stretching induced by lattice mismatch and annealing: The role of Graphene”, *Appl. Surf. Sci.*, *432*, 22–26.
- [39] Carlomagno, I., **Drnec, J.**, Scaparro, A. M., Cicia, S., Mobilio, S., Felici, R., Meneghini, C. **2018**, “Effectiveness of Co intercalation between Graphene and Ir(1 1 1)”, *Chem. Phys. Lett.*, *697*, 7–11.
- [40] Rameshan, R., Vonk, V., Franz, D., **Drnec, J.**, Penner, S., Garhofer, A., Mitterdorfer, F., Stierle, A., Klötzer, B. **2018**, “Role of precursor carbides for graphene growth on Ni(111)”, *Sci. Rep.*, *8*, 2662.
- [41] Chattot, R., Le Bacq, O., Beermann, V., Kühl, S., Herranz, J., Henning, S., Kühn, L., Asset, T., Guétaz, L., Renou, G., **Drnec, J.**, Bordet, P., Pasturel, A., Eychemüller, A., Schmidt, T. J., Strasser, P., Dubau, L., Maillard, F. **2018**, “Surface Distortion as a Unifying Concept and Descriptor in Oxygen Reduction Reaction Electrocatalysis”, *Nat. Mater.*, *17*, 827–833.
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- [44] Schmies, H., Hornberger, E., Anke, B., Jurzinsky, T., Nong-Reier, N., Köhl, S., **Drnec, J.**, Lerch, M., Cremers, C., Strasser, P. **2018**, “Elucidating the Impact of Carbon Support Functionalization on the Electrochemical Stability of Pt Fuel Cell Catalysts”, *Chem. Mater.*, *accepted*, DOI 10.1021/acscatal.8b02498.
- [45] Vamvakeros, A., Jacques, S. D. M., Di Michiel, M., Middelkoop, V., Ismagilov, I. Z., **Drnec, J.**, Senecal, P., Beale, A. M. **2018**, “Five-dimensional operando tomographic diffraction imaging of a Ni-Pd/CeO₂-ZrO₂/ Al₂O₃ catalyst bed”, *Nat. Comm.*, *accepted*.
- [46] Asset, T., Gommès, C. J., **Drnec, J.**, Bordet, P., Chattot, R., Martens, I., Nelayah, J., Job, N., Maillard, F., Dubau, L. **2018**, “Disentangling the Degradation Pathways of Highly Defective PtNi/C Nanostructures - An Operando Wide and Small Angle X-Ray Scattering Study”, *ACS Catal.*, *accepted*, DOI 10.1021/acscatal.8b02665.

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- [48] Gommès, C. J., Asset, T., **Drnec, J.** **2018**, “Small-angle scattering by supported nanoparticles: exact results and useful approximations”, *submitted to J. Appl. Cryst.*

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- [50] Bick, D. S., Muelle, D. N., **Drnec, J.**, Poulain, A., Töbrens, D., Laufen, H., Diekmann, L., Schneller, T., Nemsak, S., Cramm, S., Gunkel, F., Waser, R., Schneider, C. M., Valov, I. **2018**, “Super Structure Transition in PBCO”, *to be submitted to Nat. Mater.*
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- [54] Vinogradov, N. A., Felici, R., **Drnec, J.**, Linpe, W., Evertsson, J., Harlow, G. S., Lundgren, E. **2018**, “Sn electrodeposition in nanoporous aluminium oxide matrix observed in situ with high-energy X-ray diffraction and X-ray fluorescence”, *in preparation.*
- [55] Torrelles, X., Felici, R., **Drnec, J.**, Cantele, G., Di Capua, R., De Luca, G. M., Herranz, J., Salluzzo, M. **2018**, “Electronic and structural reconstructions at polar Ti-terminated (111) SrTiO₃ surface”, *in preparation.*
- [56] Wiegmann, T., **Drnec, J.**, Magnussen, O. **2018**, “X-ray Surface In-situ Micro-Diffraction From Very Thin Metal Electrodeposits prepared in Microfluidic Channel”, *in preparation.*