Joe Petrus

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Education

2010–today **Ph.D. | Earth Sciences**
Laurentian University, Sudbury, Canada

Mineralogical, chemical, and isotopic evolution in impact bombarded rocks
Supervisor: Prof. Balz Kamber

2007–2009 **M.Sc. | Physics**
Queen's University, Kingston, Canada

A computational and experimental study of surface acoustic waves in phononic crystals
Supervisor: Prof. James Stotz

2002–2007 **B.Sc. | Applied Physics**
University of Waterloo, Waterloo, Canada

Use of microwave dressing fields to enhance Rydberg atom interactions
Supervisor: Prof. James Martin

Experience

2011–today **LA-ICP-MS Laboratory Manager and Operator**
Laurentian University, Sudbury, Canada

- Responsible for sample preparation, analysis, and data processing, among other things. Directly involved with a diverse set of projects in geology, archeology, and biology
- Extensive use and maintenance of a Thermo X Series II quadrupole ICP-MS and a Resonetics RESOlution M-50 ArF excimer laser ablation system
- Researched, developed, and implemented new methods, *e.g.*, radiation damage and titanite dating
- Worked with clients and colleagues to obtain the best data possible, *e.g.*, implementing corrections and optimizing data acquisition parameters
- Trained other students to use lab equipment and process their data

2010–today **Ph.D. Research**
Laurentian University, Sudbury, Canada

- Reassessed the depths of melting and excavation for the Sudbury impact using Pb isotope data, U-Pb zircon geochronology, and numerical modelling
- Investigated the role of chondritic material, mafic target rocks, alteration, and volatility driven fractionation with respect to the anomalously high PGE contents associated with Sudbury fallback material
- Developed software for more efficient and accurate LA-ICP-MS data processing (*e.g.*, Petrus and Kamber 2012, 2013 and Chew *et al.* 2014 below)
- Performed hypervelocity impact simulations to explore impact melt volume production and excavation depth as a function of bolide trajectory and type
- Co-organized the Large Meteorite Impacts and Planetary Evolution V conference

2007–2009 **M.Sc. Research**
Queen's University, Kingston, Canada

- Designed and programmed a finite difference time domain phononic crystal simulator
- Developed cleanroom processes to create surface acoustic wave transducers and phononic crystals
- Studied the behaviour of surface acoustic waves incident on phononic crystals using network analysis and interferometric techniques

2007–2009 **Teaching Assistant**
Queen's University, Kingston, Canada

- Supervised and assisted fourth year physics students with labs and thesis projects
- Responsible for maintaining and teaching labs, such as: electron spin resonance, the quantum hall effect, x-ray reflectivity of thin films, and helicons in solids
- Mentor for projects, such as: high altitude balloon, fiber optic seismometer, and acoustic levitation

2004–2007 **Research Assistant / B.Sc. Research**
University of Waterloo, Waterloo, Canada

- Conducted experiments in atomic physics by exciting, manipulating, and probing Rb Rydberg atoms in a magneto-optical trap
- Designed programs to control experiments and collect and analyze data
- Administered a Linux cluster (ca. 20 nodes) used for quantum chemistry calculations

Selected Awards

Alexander Graham Bell Canada Graduate Scholarship ($35,000/year) . . . . . 2010 – 2013
Natural Sciences and Engineering Research Council
Ontario Graduate Scholarship ($15,000 - declined) 2010
Ontario Provincial Government
Alexander Graham Bell Canada Graduate Scholarship ($17,500) 2009
Natural Sciences and Engineering Research Council
Ontario Graduate Scholarship ($15,000 - declined) 2009
Ontario Provincial Government
Carl Reinhardt Fellowship ($4,150) 2009
Queen's University
Departmental Graduate Award ($7,936) 2009
Queen's University
Departmental Graduate Award ($4,500) 2008
Queen's University
Undergraduate Student Research Award ($4,500) 2005
Natural Sciences and Engineering Research Council
Undergraduate Student Research Award ($4,500) 2004
Natural Sciences and Engineering Research Council

Selected Publications and Abstracts

1) **J.A. Petrus**, D.E. Ames, and B.S. Kamber (2014) A chondritic source for the anomalously high PGE contents of the Onaping Formation, Sudbury. Submitted to Terra Nova.

2) **J.A. Petrus**, J.A. Ayer, P.C. Lightfoot, and B.S. Kamber (2014) Survival and age distribution of zircon from the Sudbury impact basin fill: Implications for the makeup of target lithologies. Submitted to the Journal of the Geological Society of London.

3) **J.A. Petrus**, R. Mathew, and J. A. H. Stotz (2014). A GaAs phononic crystal with shallow non-cylindrical holes. IEEE Transactions on Ultrasonics Ferroelectrics and Frequency Control. 61: 364-368.

4) D. Chew, **J.A. Petrus**, and B.S. Kamber (2014) U-Pb LA-ICPMS dating using accessory mineral standards with variable common Pb. Chemical Geology. 363: 185-199.

5) **J.A. Petrus** and B.S. Kamber (2013). A novel 2D LA-ICP-MS data analysis and visualization solution. Goldschmidt, Florence, Italy (abstract/poster).

6) D.J. Kontak, R.J. Horne, R.A. Creaser, **J.A. Petrus**, and D. Archibald (2013). A petrological and geochronological study of a 360 Ma metallogenic event in maritime Canada with implications for lithophile-metal mineralization in the Canadian Appalachians. Canadian Journal of Earth Sciences. 50(11): 1147-1163.

7) **J.A. Petrus**, J.A. Ayer, D.G.F. Long, P.C. Lightfoot, and B.S. Kamber (2013). Contributions to the Sudbury Igneous Complex and the depth of excavation: Evidence from Onaping Formation zircon. Large Meteorite Impacts and Planetary Evolution V, Sudbury, Canada (abstract/presentation).

8) **J.A. Petrus** and B.S. Kamber (2012) VizualAge: A novel approach to LA-ICP-MS U-Pb geochronology data reduction. Geostandards and Geoanalytical Research. 36: 247-270.

9) **J.A. Petrus**, K.C. Ross and A.M. McDonald (2012) DIIS: A cross-platform program for the reduction of x-ray diffraction data from a cylindrical area detector. Computers and Geosciences. 38: 156-163.

10) N.A. Krivolutskaya, B.I. Gongalskiy, T.B. Shlychkova, A.A. Yushin, N.N. Kononkova, **J.A. Petrus**, I.N. Tushentsova (2011) Mineralogical and geochemical characteristics of Pt-Cu-Ni ores of the Maslovsky deposit in the Noril'sk area, Russia. The Canadian Mineralogist. 49: 1479-1504.

11) **J.A. Petrus**, P. Bohlouli-Zanjani and J.D.D. Martin (2008) Ac electric-field-induced resonant energy transfer between cold Rydberg atoms. Journal of Physics B. 41: 245001(1-4).

12) P. Bohlouli-Zanjani, **J.A. Petrus**, and J.D.D. Martin. (2007) Enhancement of Rydberg atom interactions using ac Stark shifts. Physical Review Letters. 98: 203005(1-4).

13) L.Y. Zhao, A.C.L. Siu, **J.A. Petrus**, Z.H. He, and K.T. Leung (2007) Interfacial bonding of gold nanoparticles on a H-terminated Si(100) substrate obtained by electro and electroless deposition. Journal of the American Chemical Society. 129: 5730-5734

14) K. Afrousheh, P. Bohlouli-Zanjani, **J.A. Petrus**, and J.D.D. Martin (2006) Determination of the Rb-85 ng-series quantum defect by electric-field induced resonant energy transfer. Physical Review A. 74: 062712(1-4).

Other Information

I have experience with the following systems and applications:

- **Software:** GIS (Q and Arc), Illustrator, Microsoft Office (Word, Excel, Powerpoint, Access), IgorPRO *etc.*
- **Operating systems:** Apple Mac OS X, Microsoft Windows, Linux, BSD
- **Programming:** C/C++, Python, IgorPRO, MATLAB/Octave, LaTeX, Java, Fortran, LabVIEW, PHP, Javascript, HTML, CSS, Visual Basic, SQL

Memberships

- Geochemical Society
- Meteoritical Society
- Geological Association of Canada
- International Association for Mathematical Geosciences