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## RESEARCH INTERESTS

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The use of innovative organic, polymer and organometallic synthetic chemistry for the design of soft organic electronics; materials science and engineering; green chemistry and sustainable innovations; organic bioelectronics, human-machine interfaces, and soft robotics.

## EDUCATION

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**Post-Doctoral Researcher in NanoEngineering, University of California San Diego, USA, with Prof. Darren Lipomi** October 2016 – May 2019

Research: Synthesis of Intrinsically Stretchable Electronic Materials

**Ph.D. in Chemistry, McGill University, Montreal, Canada, with Prof. Bruce Arndtsen** January 2010 – April 2016

Dissertation: New Multicomponent Polymerization Approaches to Conjugated Poly(heterocycles) and Poly(1,3-dipoles)

**M.Sc. in Molecular and Supramolecular Chemistry, University of Strasbourg, France, with Prof. Pierre Braunstein** September 2007 – June 2009

Dissertation: Multinuclear Nickel Complexes Bearing N,O-Chelating Ligands for Application as Single Molecular Magnets

**B.Sc. in Chemistry with honors, University of Strasbourg, France** September 2004 – June 2007

## HONORS AND AWARDS

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- Best post-doc award, Department of NanoEngineering, UC San Diego, 2019
- Invited speaker at the Emerging Materials Researchers Symposium, CSC, Edmonton, AB, 2018
- 7 poster awards at national and international conferences (2014 – 2017)
- Best white paper at the Marcus Wallenberg Young Researcher Symposium, Stockholm, Sweden, 2015
- Center in Green Chemistry and Catalysis travel award, Montreal, 2015
- Robert Zamboni chemistry prize, Department of Chemistry, McGill University, 2015
- Graduate excellence fund travel award, Department of Chemistry, McGill University, 2015
- Otto Priefer recognition for distinguished service, Department of Chemistry, McGill University, 2014
- NSERC CREATE in Green Chemistry fellowship (2014 – 2015)
- Marcus Wallenberg Young Researcher Award, 2014
- Graduate research enhancement and travel award, Department of Chemistry, McGill University, 2014
- T. Sterry Hunt award for excellence in demonstrating in the undergraduate organic laboratories, Department of Chemistry, McGill University, 2012
- Women's scientific and technical vocation prize, Alsace region, France, 2004

## PUBLICATIONS

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16. **L. V. Kayser** and D. J. Lipomi,\* “Stretchable Conductive Polymers and Composites Based on PEDOT and PEDOT:PSS” *Advanced Materials*, **2019**, [1806133](#).
15. **L. V. Kayser**, M. D. Russell, D. Rodriguez, S. N. Abuhamdiah, C. Dhong, S. Khan, A. N. Stein, J. Ramirez, and D. J. Lipomi,\* “RAFT Polymerization of an Intrinsically Stretchable Water-Soluble Block Copolymer Scaffold for PEDOT” *Chem. Mater.* **2018**, *30*, [4459](#).
14. F. Sugiyama, A. T. Kleinschmidt, **L. V. Kayser**, M. A. Alkhadra, J. M.-H. Wan, A. S.-C. Chiang, D. Rodriguez, S. E. Root, S. Savagatrup, D. J. Lipomi,\* “Stretchable and Degradable Semiconducting Block Copolymers” *Macromolecules*, **2018**, *51*, [5944](#).
13. F. Sugiyama, A. T. Kleinschmidt, **L. V. Kayser**, D. Rodriguez, M. Finn III, M. A. Alkhadra, J. M.-H. Wan, J. Ramirez, A. S.-C. Chiang, S. E. Root, S. Savagatrup, D. J. Lipomi,\* “Effects of Flexibility and Branching of Side Chains on the Mechanical Properties of Low-Bandgap Conjugated Polymers” *Polym. Chem.* **2018**, *9*, [4354](#).
12. C. Dhong,\* **L. V. Kayser**, A. Shin, R. Arroyo, M. Finn III, A. T. Kleinschmidt, and D. J. Lipomi,\* “Role of Fingerprint-Inspired Relief Structures in Elastomeric Slabs for Detecting Frictional Differences Arising from Surface Monolayers” *Soft Matter*, **2018**, *14*, [7483](#).
11. C. Dhong, S. Edmunds, J. Ramirez, **L. V. Kayser**, F. Chen, J. Jokerst, D. J. Lipomi,\* “Optics-Free, Non-Contact Measurements of Fluids, Bubbles and Particles in Microchannels using Metallic Nanoislands on Graphene” *Nano Lett.* **2018**, *18*, [5308](#).
10. Y. Shi, H. Tang, S. Jiang, **L. V. Kayser**, M. Li, F. Liu, F. Ji, D. J. Lipomi,\* S. P. Ong,\* and Z. Chen,\* “Understanding the Electrochemical Properties of Naphthalene Diimide: Implication for Stable and High-Rate Lithium-Ion Battery Electrodes” *Chem. Mater.* **2018**, *30*, [3508](#).
9. S. E. Root, C. W. Carpenter, **L. V. Kayser**, D. Rodriguez, D. Davies, S. Wang, Y. Meng,\* and D. J. Lipomi,\* “Ionotactile Stimulation: Nonvolatile Ionic Gels for Human-Machine Interfaces” *ACS Omega* **2018**, *3*, [662](#).
8. **L. V. Kayser**, E. M. Hartigan, and B. A. Arndtsen,\* “Multicomponent Coupling Approach to Cross-Conjugated Polymers from Vanillin-Based Monomers” *ACS Sus. Chem. Eng.* **2016**, *4*, [6263](#).
7. **L. V. Kayser**, M. Vollmer, M. Welnhof, H. Kriczkiok, K. Meerholz,\* and B. A. Arndtsen,\* “Metal-Free, Multicomponent Synthesis of Pyrrole-Based  $\pi$ -Conjugated Polymers from Imines, Acid Chlorides and Alkynes” *J. Am. Chem. Soc.* **2016**, *138*, [10516](#).
6. D. C. Leitch,<sup>†</sup> **L. V. Kayser**,<sup>†</sup> Z.-Y. Han,<sup>†</sup> A. R. Siamaki, E. N. Keyzer, A. Gefen, and B. A. Arndtsen,\* “A Palladium-Catalyzed Multicomponent Coupling Approach to Conjugated Poly(1,3-Dipoles) and Polyheterocycles” *Nature Commun.* **2015**, *6*, [7411](#), <sup>†</sup> Authors contributed equally.
5. J. S. Quesnel, **L. V. Kayser**, A. Fabrikant, and B. A. Arndtsen,\* “Acid Chloride Synthesis via the Palladium-Catalyzed Chlorocarbonylation of Aryl Bromides” *Chem. Eur. J.* **2015**, *21*, [9550](#).
4. S. Hameury, **L. V. Kayser**, R. Pattacini, P. Rosa, A.-L. Barra, and P. Braunstein,\* “Synthesis, Structures and Single Molecule Magnet Behaviour of High Nuclearity Ni(II) Dicubane-type Complexes with Pyridyl-Alcohol Ligands” *Chem. Plus Chem.* **2015**, *14*, [1312](#).
3. S. Hameury, **L. V. Kayser**, R. Pattacini, G. Rogez,\* W. Wernsdorfer,\* and P. Braunstein,\* “Synthesis of Cubane-Type Ni(II) Complexes from Pyridyl-Alcohol Ligands; Their Single-Molecule Magnet Behavior” *Dalton Trans.* **2013**, *42*, [5013](#).
2. H. Staub, R. Guillet-Nicolas, N. Even, **L. V. Kayser**, F. Kleitz,\* and F.-G. Fontaine,\* “Substantiating the Influence of Pore Surface Functionalities on the Stability of Grubbs Catalyst in Mesoporous SBA-15 Silica” *Chem. Eur. J.* **2011**, *17*, [4254](#).
1. **L. V. Kayser**, R. Pattacini, G. Rogez,\* and P. Braunstein,\* “Nuclearity of Nickel and Mixed Sodium-Nickel Complexes: Dependence on the Spacer in Chelating Pyridine-Alcoholate Ligands” *Chem. Commun.* **2010**, *46*, [6461](#).

## RESEARCH EXPERIENCE

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### **Post-Doc in NanoEngineering, University of California San Diego, CA** – Advisor: Prof. Darren J. Lipomi

October 2016 – Present

- Designed intrinsically stretchable conducting and semiconducting polymers which do not rely on blending additives.
- Wrote and contributed to grant applications at several federal agencies: NSF, DOD, NIH and DOE (under review now).
- Advised 4 undergraduate, 3 graduate students and 2 post-docs from three different majors (chemistry, nanoengineering and chemical engineering) on the synthesis and integration of new materials (hydrogels, conducting polymers, liquid crystals) in electronic devices for transistors, haptic devices, solar cells and batteries.
- Collaborated with other laboratories at UC San Diego NanoEngineering: Prof. Shirley Meng, Prof. Zheng Chen, Prof. Shaochen Chen and Prof. David Fenning; at Northwestern: Prof. Jonathan Rivnay; and at Duke: Prof. Benjamin Wiley.
- Gave tutorials and lectures on organic chemistry, stretchable electronics, controlled polymer synthesis and characterization geared towards materials science and engineering students.

### **Ph.D. in Chemistry, McGill University, Montreal, Canada** – Advisor: Prof. Bruce A. Arndtsen

January 2010 – October 2016 (Post-doctoral appointment from June 2016 to October 2016)

- Developed one-pot, multicomponent polymerization approaches to conjugated polymers via palladium catalysis or phosphonite mediation.
- Collaborated with Prof. Klaus Meerholz (University of Cologne) and his group on the design of conjugated polymers for application in light-emitting diodes (LED) and transistors.
- Solved the crystal structure of over 15 organic and organometallic compounds by single crystal X-ray crystallography.
- Trained and guided three graduate and two undergraduate students on multiple aspects of chemistry: safety, organic and polymer synthesis, data analysis, methodology, poster and oral presentation, etc.

### **Member of the NSERC Collaborative Research and Training Experience (CREATE) Program in Green Chemistry**

September 2014 – December 2015

- Multidisciplinary student training program in leadership, new policies and techniques, challenges and business opportunities associated with Green Chemistry.
- Developed greener methodologies for the synthesis of conjugated polymers.

### **Member of the NSERC Biomaterials and Chemicals Research Network (Lignoworks), Canada**

May 2012 – January 2016

- Research program aiming at producing lignin-based materials and chemicals as an alternative to petroleum sources (polymeric products, thermochemical and catalytic processing).
- Developed multicomponent strategies for the incorporation of renewable materials such as lignin and cellulose derivatives in conjugated polymers.
- Participated in workshops, panel discussions, and case study competitions with the interdisciplinary FIBRE (Forest Innovation by Research and Education) NSERC network.

### **M.Sc. in Coordination Chemistry, University of Strasbourg, France** – Advisor: Prof. Pierre Braunstein

September 2008 – May 2009

- Synthesized multinuclear paramagnetic metal complexes for applications as single molecular magnets (SMM) by modifying the stoichiometry of the reaction, the metal, and the ligand.
- Collaborated with Prof. Guillaume Rogez (IPCMS) to study the SMM behavior of the metal complexes.

### **Research Assistant in Inorganic Chemistry, Laval University, Québec, Canada** – Advisors: Prof. Freddy Kleitz and Prof. Frédéric-Georges Fontaine

April 2008 – August 2008

- Synthesized and characterized mesoporous silica (SBA-15) and functionalized their surface with Grubbs olefin metathesis catalyst for “boomerang” supported catalysis.

### **Research Assistant at the DECOMET Laboratory (UMR 7177), University of Strasbourg, France** – Advisor: Prof. Stéphane Bellemin-Laponnaz

May 2007 – July 2007

- Synthesized *N*-heterocyclic carbenes for potential application in enantioselective catalysis.

## TEACHING EXPERIENCE

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- Guest lecturer for NANO 134 at UC San Diego: Polymeric materials  
RAFT polymerization, GPC, stretchable electronics – 1 lesson May 2018
- Guest lecturer for NANO 101 at UC San Diego: Introduction to NanoEngineering  
[Introduction to Organic Chemistry](#) – 2 lessons (available on YouTube) January 2018
- Teaching assistant, McGill University 2010 – 2013
- First and second year undergraduate organic chemistry laboratories
  - Third year undergraduate advanced organic chemistry laboratory course for biochemists
  - Third year undergraduate integrated organic-inorganic laboratories

## LEADERSHIP AND PEER-REVIEW EXPERIENCE

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- Discussion Leader - Bioelectronics Gordon Research Conference June 2019
- Organizing member of the Association for Women in Science (AWIS) San Diego Outreach Committee 2017 – 2019
- Organized AWIS activities for Chem Expo 2017 at Miramar College.
  - Organized the 2018 AWIS STEM career conference for high school and community college women.
  - Volunteered at Maker Faire San Diego.
- Reviewer for ACS Applied Materials and Interfaces and Advanced Materials 2017 – Present
- Nominated departmental representative for the UC San Diego post-doctoral association 2017 – 2019
- Promoted and helped organizing events for post-docs at UCSD.
- Panelist for the IDEA (Inclusion - Diversity - Excellence - Achievement) Engineering Student Center at UC San Diego “Working with your PI and getting the kind of mentorship you want” November 2016
- Graduate student representative of the Chemical Institute of Canada – Montreal Section 2015 – 2016
- Helped organizing and promoted activities for the CIC Montreal section.
- Organizer of the McGill Chemistry Students Invited Lecture Series 2012 – 2016
- Invited the speakers, organized the lecture and agenda, fund sponsors and managed the budget.

## SELECTED PRESENTATIONS

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*Stretchable and conductive block copolymers for biocompatible electronics*, **poster presentation**, Bioelectronics Gordon Research Conference, Andover, NH, June 2019.

*Intrinsically Stretchable and Conductive Polyelectrolyte Complex for Wearable Organic Electronics*, **invited lecture**, Emerging Materials Researcher Symposium, Canadian Chemistry Conference, Edmonton, AB, May 2018.

*Water-Soluble Conducting Elastomers for Stretchable Organic Electronics*, **oral presentation**, Materials Research Society Meeting, Phoenix, AZ, April 2018.

*RAFT Polymerization of an Intrinsically Stretchable Ionic Triblock Copolymer Scaffold for PEDOT*, **oral presentation**, American Chemical Society Meeting, New Orleans, LA, March 2018.

*RAFT Polymerization of Water-Soluble Ionic Elastomers for Stretchable Organic Electronics*, **poster presentation**, 3<sup>rd</sup> Functional Polymeric Materials Conference, Rome, Italy, July 2017.

*Lignocellulosic-Based Monomers in the Multicomponent Synthesis of Conjugated Polymers*, **invited lecture**, Fibre Day and PaperWeek, Montreal, QC, February 2016.

*New Multicomponent Polymerization Approaches to Conjugated Polyheterocycles and Poly(1,3-Dipoles)*, **invited lecture**, CREATE in Green Chemistry, Montreal, QC, January 2016.

*3D-Printing and Knitting of Cellulose: Stepping into the Future of the Textile Industry*, **invited lecture**, presentation of the Dress from Forest white paper, Stockholm, Sweden, September 2015.

*Multicomponent Synthesis of  $\pi$ -Conjugated Polymers*, **invited lecture**, University of Cologne, Germany, October 2014.

## REFERENCES

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**Prof. Darren Lipomi**

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