

Lauren J. LeSergent

MASc. Candidate

**Nano Collaboration with Mechanical
Engineering**

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RESEARCH INTERESTS

- Thermite nanolaminates
- Polymer encapsulated thermite
- Particle-based Cancer treatment

EDUCATION

- **University of Waterloo**, Waterloo, ON
Candidate for MASc., Nano Collaboration with Mechanical Engineering
9/16-present
Supervisors: Prof. John Wen, Prof. Carolyn Ren
- **University of Waterloo**, Waterloo, ON
Candidate for BAsC., Honors Nanotechnology Engineering
9/11-04/16

TECHNICAL SKILLS

- **Synthesizing and manipulating nanoparticles**
Metal nanowires, quantum dots, gold nanoparticles, ferrocene based magnetic ceramics, CNTs
- **Creating thin-films and optical coatings**
Electrophoretic deposition (EPD), chemical vapor deposition (CVD), spin coating, sputtering
- **Cleanroom and Microfabrication experience**
Photolithography, plasma-enhanced CVD (PECVD), etching, physical vapor deposition (PVD)
- **Characterization methods**
Scanning electron microscopy (SEM), x-ray diffraction (XRD), spectroscopy, high temperature simulated distillation (HTSD), gas chromatography (GC), Thermogravimetric analysis (TGA), cyclic voltammetry (CV), dektak
- **Polymer synthesis and wet chemistry experience**
Atom transfer radical polymerization, reverse addition-fragmentation chain-transfer polymerization, emulsion polymerization

RESEARCH EXPERIENCE

Undergraduate Research Assistant, Energy Research Centre, University of Waterloo, Waterloo, ON 9/15-present

- Developed a method to deposit thin-films of SWNTs (single-walled carbon nanotubes) directly onto uncoated silicon wafers using electrophoretic deposition
- Removed the need for a metal layer on the silicon, as it is generally difficult to generate a strong enough current through silicon for electrophoretic deposition, allowing for thinner, lighter, lower cost electrodes

Research Assistant/ Pilot Plant Operator, CanmetENERGY, Natural Resources Canada, Devon, AB 1/15-8/15

- Developed a method to quantify oil-water-sediment interactions during a spill, where previous research methods could only give qualitative interaction data.
- Identified tar ball formation, tendency to submerge, and sediment interactions at a chemical level by analyzing time-dependent samples
- Created a model relating oil viscosity to sediment interactions and buoyancy. Proved that, in complex spill conditions, the tendency of an oil to submerge can depend more on viscosity than on density
- Helped design and operate pilot plants for simulating oil spills and environmental conditions
- Performed High Temperature Simulated Distillation and hydrocarbon analysis

Lithium Ion Thin-Film Electrode Research, Institute of Chemical Power Sources (through the College of Physics, Optoelectronics and Energy), Soochow University, Suzhou, Jiangsu, China 9/13-4/14

- Tasked with creating cathodes that were less expensive, safer, and better performing than industry standards
- Synthesized electrode materials and create thin films on aluminum bases
- Examined the effects of synthesis temperature, content of metals, and lattice structures, on lifetime and performance of NMC (nickel manganese cobalt) batteries
- Performed electrochemical tests and materials characterization using x-ray diffraction, cyclic voltammetry, and LAND CT2001A stations

Data Analyst, Environment Canada, Toronto, ON, 1/13-4/13

- Operated and set up Cavity Ring-Down Spectrometers, Off-Axis Integrated Cavity Output Spectrometers, and Absorption Spectrometers in mobile and stationary labs for the purpose of determining emissions from tailings ponds and oil fields
- Analyzed data, created programs, and performed statistical analysis

Air Quality Monitoring, the City of Grand Forks, Grand Forks, BC, 9/12

- Found links between particulate pollution (PM_{2.5}) levels and physical location, which were able to identify industries and geographic phenomena contributing to abnormally poor air quality in the city.
- Collected real-time air samples using a mobile nephelometer in partnership with the University of Victoria

PRESENTATIONS AND REPORTS

- “Mesoporous Zeolites for Improved Diffusion” – Nanostructured Materials Presentations 2015, Waterloo, ON
- “Quantification of Oil-Water-Sediment Interactions During Petroleum Spills in Water Environments”- Term Presentations 2015, CanmetENERGY, Natural Resources Canada, Devon, AB
- “Quantification of Oil-Water-Sediment Interactions-Safe Operating Procedures”-SOP-CanmetENERGY, Natural Resources Canada, Devon, AB
- “CNC Enhanced Gel”-Schlumberger Celluforce Design Competition on Sustainable Nanomaterials 2014, Waterloo, ON. (Awarded third prize)
- “Mobile Nephelometer Monitoring of the Grand Forks Airshed”- City Report 2012, Grand Forks, BC

EXTRACURRICULAR ACTIVITIES

- **GCWCC (Government of Canada Workplace Charitable Campaign)**, Devon, AB, 01/15-08/15
- **Orientation leader**, University of Waterloo, ON, 5/12-5/15
- **First Year Mentoring Director**, University of Waterloo, ON, 5/14-9/14
- **WIE Mentor**, University of Waterloo, Waterloo, ON, 09/12 – 9/13