



# **Nano-enabled materials: Fundamentals to Applications**

**9<sup>th</sup> Annual Nano Ontario Conference**

**November 22<sup>nd</sup> and 23<sup>rd</sup>, 2018**

**Carleton University, Ottawa**

**2<sup>nd</sup> Floor, Richcraft Hall**

# Message from the Chair of NanoOntario

Welcome to the 9th Annual NanoOntario conference organized by Carleton University.



It is my pleasure to witness a sustainable continuity from our first conference organized by Western in 2010 highlighting a remarkable activity in the field of nanoscale science led by our Universities and colleges as well as by many Ontario-based industries.

Importantly, this level of activity is enabled through strategic investments through Canadian fund for innovation and Ontario research funds but also and importantly by many collaborative grants from NSERC, MITACS, OCE and other grants that are beneficial to our industries, our researchers and our students.

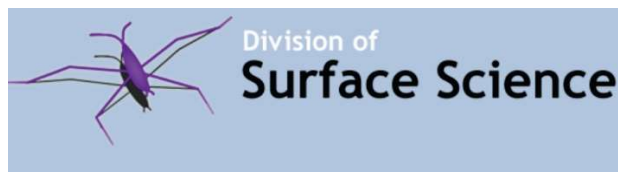
The unique quality and complementarity of the nanoscale science infrastructures in Ontario represents hundreds of millions of investment in the past decade that have been critical to facilitate our nanoscale discoveries. Many current projects using nanomaterials and nanofabrication methods in critical fields such as materials for energy, electronic and photonics devices as well in the application of nanotechnologies for biomaterials and biosensing for both fundamental discoveries and applications highlighting the diversity and excellence of nanoscale research in Ontario.

Our visibility through NanoOntario is critical to the success of present and future activities in the field further promoting Ontario's excellence in Canada and abroad in the field of nanoscience and nanotechnologies.

Today, we are gathered at Carleton to present our results, to network, to think about new ideas or fruitful collaborations as well as to protect our interests in the productive field of nanoscale science.

Francois Lagugné-Labarthet  
Chair of NanoOntario

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# Nano-enabled materials: Fundamentals to Applications

NanoOntario Symposium, November 22<sup>nd</sup>-23<sup>rd</sup>, 2018

2<sup>nd</sup> Floor Richcraft Hall, Carleton University

Time	DAY 1: November 22 <sup>nd</sup> , 2018
12:00 – 1:00 pm	Registration: Second Floor Richcraft Hall
1:00 – 1:05 pm	Welcome and Opening Remarks
1:05 – 1:50 pm	<b>Keynote Lecture: Prof. Tito Scaiano, University of Ottawa</b> “From Cosmetics to Green Catalysis Inspired by Crop Rotation Practices in Agriculture. The many faces of Titanium Dioxide”
1:50 - 2:10 pm	<b>Prof. Eva Hemmer, University of Ottawa</b> “New strategies towards lanthanide-based materials for optical and magnetic applications”
2:10 - 2:30 pm	<b>Prof. Stefania Impellizzeri, Ryerson University</b> “Molecular Switches for Fluorescence Nanoscopy: Applications for Nanocatalysis and Super-Resolution Bioimaging”
2:30 – 2:50 pm	Break
2:50 – 3:25 pm	<b>Prof. Kevin Stamplecoskie, Queen’s University</b> “Atomically Precise Metal Clusters: Photochemical Synthesis and Photocatalysis”
3:25 – 4:00 pm	<b>Dr. Li-Lin Tay, National Research Council</b> “Plasmonic Nanostructures for Small Molecule Sensing – Design Consideration for Optimal SERS”
4:00 – 4:20 pm	<b>Prof. Ian Hamilton, Wilfrid Laurier University</b> “Chiral Gold Nanorod and Nanocage Structures”
4:20 – 4:40 pm	<b>Prof. Ribal Georges Sabat, Royal Military College</b> “Plasmonic Energy Exchange for Precise Light-based Biosensors”
4:40 – 5:00 pm	<b>Dr. Premkumari Kumarathasan, Health Canada</b> “In Vitro Screening of Engineered Nanomaterials for Relative Potencies: Carbon Nanotubes and Nano Silica Variants”
5:00 – 6:30 pm	<b>Poster Session and Networking Dinner Reception</b> Cash Bar available

<b>6:30 – 8:00 pm</b>	<p><b>Panel Discussion: "Moving your nanotechnology research from the lab to the marketplace"</b></p> <p><i><b>Panelists:</b></i>  <b>Prof. John Dutcher</b> - Professor at the University of Guelph and Founder of Mirexus Biotechnologies: <a href="http://mirexusbiotech.com/">http://mirexusbiotech.com/</a>  <b>Estelle Chen</b> - Regional Market Leader, Technology and Innovation - BMO Financial Group  <b>John Jackson</b> - Acting Deputy Director (Ontario), NSERC  <b>Dr. Mark Vickers</b> - Partner at BLG (and Ph.D. in Biochem)  <b>Djordje Vladislavjevic</b> - Acting Section Head, Nanotechnology Section - Health Canada</p>
<b>Time</b>	<b>DAY 2: November 23<sup>rd</sup>, 2018</b>
<b>8:00 - 8:30 am</b>	<b>Registration Second Floor Richcraft Hall</b>
<b>8:30 – 8:40 am</b>	<b>Flash Talk: Anna Koudrina, Carleton University</b> "Fibrinogen aptamer-conjugates for targeted MRI contrast"
<b>8:40 - 8:50 am</b>	<b>Flash Talk: Daniel Prezgot, Carleton University</b> "Thermoplasmonic Patterning of Silver Nanocrystal/Polymer Thin Film Composites"
<b>8:50 – 9:00 am</b>	<b>Flash Talk: Andrew Hainer, University of Ottawa</b> "Titanium Dioxide as a highly efficient and overlooked ether-radical generator"
<b>9:00 - 9:35 am</b>	<b>Dr. Azam Tayabali, Health Canada</b> "Mechanistic models to assess the toxicological potential of OECD representative zinc oxide and silver nanoparticles"
<b>9:35- 10:05 am</b>	<b>Dr. Shan Zou, NRC</b> "Morphology control and toxicity assessment of graphene oxide"
<b>10:00-10:10 am</b>	<b>Flash Talk: Ayda Alhage, University of Ottawa</b> "Glass fiber: novel applications as support for heterogeneous catalysis"
<b>10:10-10:20 am</b>	<b>Flash Talk: Goonay Yousefalizadeh, Queen's University</b> "A Single Model for the Excited State Dynamics of Au <sub>18</sub> (SR) <sub>14</sub> and Au <sub>25</sub> (SR) <sub>18</sub> Clusters"
<b>10:20-10:30 am</b>	<b>Flash Talk: Florence Victoria, Concordia</b> "Residual Chirality in Carbon Dots from Enantiomers of Amino Acids"

<b>10:30-10:45 am</b>	<b>Break</b>
<b>10:45-11:30 am</b>	<b>Keynote Lecture: Prof. Hanadi Sleiman, McGill University</b> "Supramolecular DNA Structures: From Design to Function"
<b>11:30-11:40 am</b>	<b>Flash Talk: Danielle McRae, Western</b> "Investigation of Surface Plasmon Modes in Sierpinski Fractal Metastructures"
<b>11:40-11:50 am</b>	<b>Flash Talk: Anabel Lanterna , University of Ottawa</b> "Light tuning of the catalytic activity of decorated TiO <sub>2</sub> : versatility throughout the UV-Vis spectrum"
<b>11:50-12:00 pm</b>	<b>Flash Talk: Xin Luo, McGill</b> "Construct complex Gold Nanoparticle Structures using DNA as a Chaperone"
<b>12:00-1:30 pm</b>	<b>Lunch and Poster Networking</b>
<b>1:30 -1:50 pm</b>	<b>Prof. Suresh Gadde, University of Ottawa</b> "Combination nanomedicines for the treatment of triple negative breast cancer"
<b>1:50 - 2:10 pm</b>	<b>Prof. Maxim Berezovski, University of Ottawa</b> "Noninvasive Microsurgery Using Aptamer-Functionalized Magnetic Microdisks for Tumor Cell Eradication"
<b>2:10 - 2:30 pm</b>	<b>Prof. Emilio Alarcon, University of Ottawa Heart Institute</b> "Nanoengineered Materials for Tissue and Organ Repair"
<b>2:30 - 2:40 pm</b>	<b>Flash Talk: Trent Gordon, Western University</b> "Development of Poly(ester amide) Particles for Intra-Articular Drug Delivery"
<b>2:40 - 2:50 pm</b>	<b>Flash Talk: Vanessa Susevski, University of Ottawa</b> "Aptamer-Assisted Liquid Biopsy"
<b>2:50 - 3:00 pm</b>	<b>Flash Talk: Jun-Ray Macairan, Concordia</b> "Intracellular Ratiometric Temperature Sensing Using Fluorescent Carbon Dots"
<b>3:00 - 3:10 pm</b>	<b>Flash Talk: Hannah Ramsey, Queen's University</b> "The Power of EEM Spectroscopy in the Characterization of Complex Mixtures of Silver Clusters"

<b>3:10 – 3:30 pm</b>	<b>Break</b>
<b>NanoOntario Awards Lectures</b>	
<b>3:30-4:00 pm</b>	<b>Outstanding Early-career Achievements in Nanoscience and Nanotechnology in Ontario: Prof. Jennifer Chen, York University</b> “Plasmonic Nanoparticle Assemblies for Sensing”
<b>4:00-4:30 pm</b>	<b>Outstanding Mid-career Achievements in Nanoscience and Nanotechnology in Ontario: Prof. Shirley Tang, University of Waterloo</b> “Nanocarbon-Bio Hybrid Materials: Chemistry and Applications”
<b>4:30-5:00 pm</b>	<b>Outstanding Lifetime Achievements in Nanoscience and Nanotechnology in Ontario: Dr. Linda Johnston, National Research Council</b> “Quantification of Nanomaterial Surface Groups”
<b>5:00 – 5:15 pm</b>	<b>Closing Remarks</b>



## **Poster List**

- 1) **Danielle McRae**, Isobel Bicket, Edson Bellido, Gianluigi Botton, and François Lagugné-Labarthe. "Investigation of Surface Plasmon Modes in Sierpinski Fractal Metastructures"
- 2) **Ying Sun**, Filip Kunc, Vinod Balhara, Brian Coleman, Andreas Brinkmann, Gregory Lopinski, Linda Johnston. "Surface Amine Quantification on Silica Nanoparticles: A Multi-Method Approach"
- 3) **Matthew Griffiths**, Peter Pallister, David Mandia, Seán Barry. "Atomic Layer Deposition of Gold Metal"
- 4) **Sydney Buttera**, David Mandia, Seán Barry. "Preliminary studies of aluminum compounds with guanidinate and other nitrogen-containing ligands as precursors for aluminum nitride PE-ALD"
- 5) **Trent Gordon**, Ian Villamagna, Mark Hurtig, Frank Beier, and Elizabeth R. Gillies. "Development of Poly(ester amide) Particles for Intra-Articular Drug Delivery"
- 6) **Ayda Alhage**, Bowen Wang, Anabel lanterna, and Tito Scaiano "Glass fiber: novel applications as support for heterogeneous catalysis"
- 7) **John Hulse**, Shawn Poirier, Li-lin Tay, and Jeff Fraser "Computational Simulation of Optical Field Confinement of Self-assembled Anisotropic Plasmonic Superlattice".
- 8) **Eliya Farah**, Suresh Gadde, Sara Elsahli, and Zaina Kahiel " Nanotechnology-based therapeutic approaches for Alzheimer's Disease (AD)".
- 9) **Zainab Abdulsada**, Richard J. Kibbee, Banu Örmeci, and Maria DeRosa "Impact of AgNPs and CuO NPs on bacterial communities during anaerobic digestion of wastewater sludge".
- 10) **Erin McConnell**, Meghan Rothenbrocker, Sahar Esmaeili Samani, Carlos Filipe, and Yingfu Li. "DNAzyme-based biosensors for the detection of pathogenic bacteria"
- 11) **Alexandra Gale-Mouldey**, and Anatoli Ianoul "Synthesis of silver/oxide core/shell nanoparticles".
- 12) **Joseph Cirone**, Syed Ahmed, and Aicheng Chen "Electrochemical Study of Cobalt/Graphene Quantum Dots for Water Splitting".
- 13) **Peter Gordon**, Fernanda Monteiro, and Sean Barry "Stabilization of Plasmonic Gold Nanostructures by Pinning with Atomic Layer Deposition".
- 14) **Yuxing Wang** "A Membrane Biosensor for the Detection of Lactate in Body Fluids".
- 15) **Maohui Chen**, Arnab K. Mukherjee, Zygmunt Jakubek, Shan Zou, and Linda Johnston "Fractionation of Cellulose Nanocrystal Reference Material by Asymmetric Flow Field Flow Fractionation (A4F)"



- 16) **Ina Na**, and David Kennedy “An Investigation of Copper Nanoparticle Stability and Cytotoxicity”
- 17) **Zaina Kahiel**, Sara El-Sahli, Eliya Farah, Andrew Sulaiman, and Suresh Gadde “Three-in-one nanomedicines for the treatment of triple negative breast cancer”
- 18) **Joshua van der Zalm**, Xin Chang, Jiali Wen, and Aicheng Chen “Electrochemical Treatment of Lignin Using Modified Titanium Dioxide Nanotubes”
- 19) **Andrey Boyadzhiev**, Dongmei Wu, Luna Rahman, Christine Lemieux, and Sabina Halappanavar “An Organ Culture Method to Rapidly Screen Nanomaterial Induced Lung Responses in Mice”
- 20) **Esther Afolayan** “Development of polymer-based delivery and storage platforms”
- 21) **Gregory Lopinski**, Shan Zou, Paul Finnie, Jacques Lefebvre, and Dusan Vobornik “Nanocarbon Metrology”.
- 22) **Emily Mastronardi**, Carlos Monreal, and Maria DeRosa “Development of crop exudate-specific aptamers for use in “smart materials””.
- 23) **Sathya Srinivasan**, Velu Ranganathan, Maria DeRosa, and Bhaskar Mohan Murari “Aptamer and nanomaterial-based biosensors for the detection of various targets”.
- 23) **Daniela T. Marquez**, Walid Hassen, Khalid Moumanis, Eric Frost, and Maria DeRosa “Polymer Brushes on GaAs: A Promising Platform for Biosensing Applications”.
- 24) **Madison Ferguson**, Evan Monk and Maria DeRosa “Islet Amyloid Polypeptide (IAPP) Nanostructural Conformation Changes Induced By Inhibitors Or Activators”.
- 25) **Selvan Mohan**, and Maria DeRosa “Morphological Transformation of Nanoparticles from Commercial Products by Weathering Through Use Scenarios, Leaching, and Wastewater”.
- 26) **Eman Hassan**, Maria DeRosa, Bill Willmore, and T. Ozaki “Aptamers: toward high sensitive detection of metastatic breast cancer cells via Terahertz chemical microscopy”
- 27) **Jasmine Hong**, Eman Hassan, Ranganathan Velu, Sathya Srinivasan, and Maria DeRosa “Development of an Aptamer-Based Biosensor for Mammaglobin A”
- 28) **Aya Kadri** and Anatoli Ianoul “Synthesis of Chiral Gold Nanocubes”
- 29) **Jerry Augustine**, Timothy Cheung, Yadienka Martinez-Rubi, Benoit Simard, and Shan Zou “Dispersion, Manipulation, and Characterization of Boron Nitride Nanotube Reference Material”.
- 30) **Timothy Cheung**, Jerry Augustine, Valerie Gies, Gregory Lopinski, and Shan Zou “The Impact of Processing on the Cytotoxicity of Graphene Oxide”.

- 31) **Maria Aviles**, Madalena Kozachuk, Ronald Martin, Tsun-Kong Sham, and François Lagugné-Labarthe "Characterizing a 19th Century Hand-Colored Daguerreotype by Synchrotron, Micro-Raman and Micro-Fourier Transform Infrared Spectroscopies"
- 32) **Jessica Velicogna**, Dina Schwertfeger, Claudia Beer, Joner Kuo, and Maria DeRosa "The Fate and Effects of Nano Copper Oxide to Soil Invertebrates".
- 33) **Cristina Anaya-Gonzalez**, Francisco Bosca, and Evelyn Orbe "Developing a new upconversion nanosystem for controlled anticancer drug delivery using human serum albumin complexed with a coumarin derivative phototrigger".
- 34) **Emma Jorgenson**, Shawn Poirier, Jeff Fraser, Ali Ghaemi, John Hulse, and Li-Lin Tay "Flexible SERS nanosensors for small molecule detection".
- 35) **Denis Therien**, and François Lagugné-Labarthe "Nonlinear Optical Microscopy of Fractal Metastructures"
- 36) **Sina Talebi** Moghaddam, Stephen Robinson-Enebeli, Nigel Singh, Anna Klinkova, and Kyle Daun "Investigating the origin of the measured signal during laser-induced incandescence experiments on metallic nanoparticles".
- 37) **Ranganathan Velu**, and Maria C. DeRosa "Lateral Flow Assay Nano-Aptasensors for Mycotoxins Detection".
- 38) **Ranganathan Velu**, Nadine Frost, and Maria C. DeRosa "Paper-Based and Lateral Flow Assay Nano-Aptasensors for Mycotoxins Detection".
- 39) **Ranganathan Velu**, Sathya Srinivasan, and Maria C. DeRosa "Nanoaptasensor based multiplex assays for the detection of mycotoxins".
- 40) **Fiona Ebanks**, Jeff Smith, Maria DeRosa "The Extraction and Quantification of 25-Hydroxyvitamin D3 (25(OH)D3) using DNA Aptamer-based Solid Phase Extraction (SPE) in Tandem with Liquid Chromatography Mass Spectrometry (LCMS)."
- 41) **Mohammadreza Shahzadeh**, Mizanur Rahman, Khaled Parvez, Cinzia Casiraghi, Simone Pisana "Non-diffusive and anisotropic thermal properties of nanoscale materials".