

Short Curriculum Vitae -- Muhammad N. Yousaf

A. PERSONAL

Department of Chemistry
Centre for Research on Biomolecular Interactions
York University
Toronto, ON, Canada
M3J 1P3

E-mail: isosbestic@gmail.com
mnyousaf@yorku.ca
Telephone: (416) 736-2100 ext-77712
(416) 736-2100 ext-77718
Cell: (647) 972-2745

BIOGRAPHICAL SKETCH

NAME		POSITION TITLE	
Muhammad Naveed Yousaf		Professor , Dept. of Chemistry, York University, Toronto, Canada	
EDUCATION/TRAINING			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Harvard University, Boston, MA	Ph.D. M.S. B.Sc. (Hon)	2001-04	Postdoc (Cell Biology)
University of Chicago, Chicago, IL		2001	Chemistry/Materials
University of Massachusetts		1996	Chemistry
York University, Toronto, Canada		1994	Chemistry/Biology

Research Interests: Surface Chemistry, Nanoscience, Bioanalytical Chemistry, Biomaterials, Chemical Biology, Synthetic Chemistry, Cell Biology, Bioengineering.

Website: <https://sites.google.com/site/muhammadnyousaf1/home>

Education

- 2004 Postdoctoral Fellow; **Harvard University** Medical School, Boston, MA, USA (Advisor: Marc W. Kirschner)
- 2001 Ph.D. in Chemistry; **University of Chicago**, Chicago, IL, USA (Advisor: Prof. Milan Mrksich)
- 1996 M.S. in Chemistry; **University of Massachusetts**, MA, USA
- 1994 B.Sc (Hon); **York University**, Toronto, ON, Canada

Professional Experience

- 2015 -** Full Professor, Department of Chemistry, York University, Toronto, Canada
- 2012 – 2015** **Full Professor and Chair, Department of Chemistry, York University, Toronto, Canada**
- 2011 –** Assoc. Professor, Department of Chemistry, York University, Toronto, Canada
- 2005 - 2011** Assistant Professor, Department of Chemistry, Carolina Center for Genome Science, Lineberger Cancer Center, **University of North Carolina, Chapel Hill, NC, USA**
- 2003 - 2004** Instructor, Institute of Chemistry and Cell Biology, **Harvard University**, Boston, MA.
- 2001 - 2003** Postdoctoral Fellow, Department of Cell Biology, **Harvard University**, Boston, MA.

HONOURS AND AWARDS:

- 2015 Visiting Professor CNRS Gif-Sur Yvette (France)
- 2015 Visiting Professor ETH (Zurich, Switzerland)
- 2014 Visiting Professor at Korean Advanced Institute of Technology (KAIST), Korea.
- 2013 Visiting Professor at Marie Curie Inst. (Paris, France)
- 2012 Visiting Professor at EPFL (Lausanne, Switzerland)
- 2012 CHERD (Chairs and Heads Workshop) Toronto, Canada
- 2012 NSERC Accelerator Award (Canada)

Short Curriculum Vitae -- Muhammad N. Yousaf

- 2012 Canadian Foundation for Innovation – Leaders Opportunity Fund Award
2012 York University, FSE Imagine Award
2011 Chemical and Engineering News Highlight - **C&E News 2011, 49, 36.**
2011 Guest Editor International Journal of Analytical Chemistry (Biomaterials)
2011 Chemical and Engineering News Highlight - **C&E News 2011, 29, 27.**
2011 Science Magazine Highlight - Editors Choice - **Science 332, 1011 (2011)**
2011 **J.Am.Chem. Soc. SELECTS** (special issue on biosurfaces/biomaterials) issue #11
2011 **Marcus Lecture - Washington Univ. St. Louis**
2010 Editor for Journal of Biointerphases
2010 Editor for Methods in Molecular Biology: Volume series on Cell Mobility
2010 Editorial Board for Journal of Biochips and Tissue Chips
2010 Editorial Board for Journal of Biotechnology and Biomaterials
2010 ChemComm Emerging Investigator
2010 Sigma Xi
2009 National Cancer Institute (nanocancer center) Young Faculty Highlight
2009 **National Science Foundation CAREER Award** (\$600,000)
2008 Molecular Biosystems Emerging Investigator
2008 Young Academic Investigators Symposium Speaker, ACS Meeting, New Orleans
2005 Burroughs-Wellcome Faculty Focus Highlight
2005 HHMI-Burroughs Wellcome New Faculty Lab Management
2003 Keck-National Academy of Science Futures Initiative
2004-2009 **Burroughs-Wellcome Interface Career Award** (\$600,000)
2001-2004 **Damon Runyon-Walter Winchell Postdoctoral Fellowship** (\$150,000)
2003 News of the Week, Chemical and Engineering News, **C&E News 2003, 81, 11**
2001 News of the Week, Chemical and Engineering News, **C&E News 2001, 79, 13**
2001 **Nature** News Wire March 27, 2001.
2000 News of the Week, **Science 2000, 1477**
1999 Chemical and Engineering News Highlight, **C&E News 1999, 77, 11**
1995-1996 John Masteracola Memorial Award for Excellence in Graduate Research

PERSONAL STATEMENT.

Prof. Muhammad N. Yousaf grew up in Toronto, Canada and studied inorganic chemistry at York University in Toronto as an undergraduate with Prof. Dennis Stynes. He then moved to the USA and pursued his PhD studies in surface chemistry and material science at the University of Chicago with Milan Mrksich followed by a cell biology postdoctoral fellowship at Harvard University with Marc Kirschner. Dr. Yousaf has recently returned to his hometown of Toronto and his alma mater. He is currently a Full Professor and Chair of the Department of Chemistry at York University (2012-). He previously was a chemistry and biology professor at the University of North Carolina at Chapel Hill (USA) (2005-2011). His research interests are in surface chemistry, nanoscience, biomaterials and chemical biology.

As a PI since 2005, he has published more than 75 original papers and book chapters, given over 200 seminars at universities and conferences including plenary and named lectureships and has been elected to serve on 5 journal advisory and editorial boards. His research has been highlighted multiple times in JACS, Nature, Science and Chemical and Engineering News and several print and online media circulars. Dr. Yousaf has received several national awards including, a Damon Runyon Fellowship, Burroughs Wellcome Interface Career Award, NSF CAREER award and a Canadian NSERC Discovery Accelerator Award. Dr. Yousaf is very proud of his highschool, undergraduate and graduate students

who have also received numerous state, provincial and national awards including, OGS, USRA, M3 Create Award, Barry Goldwater Award, Churchill Scholar (Cambridge), NSF Predoctoral Fellowship, American Cancer Society Postdoctoral Fellowship, NIH Postdoctoral Fellowship, Lymphoma and Leukemia Postdoctoral Fellowship, Howard Hughes Postdoctoral Fellowship, High School State and National Westinghouse Awards and a Nobel Laureate Lindau Meeting award.

SUMMARY OF PUBLICATIONS AND PROFESSIONAL CONTRIBUTIONS

i. Developing New Surface Chemistries Applied to Studying Interfacial Chemical Reactions and Cell Behaviour.

-- This research program is multidisciplinary and is concerned with the development of 1. model substrates based on sophisticated dynamic surface chemistry that mimics the extracellular matrix to study cell behaviour and 2. The development of renewable next-generation biosensor microarrays and 3. New nanoparticles with modular surface chemistry for solar cell energy applications. The development of strategies to control the interface between biomolecules and a solid support is critical to a number of research areas, including drug discovery, tissue engineering, cell biology, small molecule, carbohydrate and gene/protein microarray technology. As a PI, my laboratory has produced over 75 peer-reviewed publications in the last 9 years with many in high impact journals (*15 JACS and Angew. Chem. Int. Ed. papers*) and with highlights in ***Science, Chemical and Engineering News, Faculty of 1000, JACS SELECTS*** and press highlights in *NewsRX, Vertical News and Global Medical Discovery News*. I am also on the editorial boards of 6 journals. I believe, I have a unique program in interfacing surface chemistry and nanoscience with cell biology for a range of fundamental studies in cell behaviour, understanding fundamental surface science and using biosurfaces as a platform for new micro- and nanoarray biotechnologies.

ii. Tailoring Human Cell Surfaces via Liposome Fusion for Tissue Engineering Applications.

-- The ability to spatially and temporally direct 3-dimensional tissue assembly comprised of multiple cell lines is crucial for next generation therapeutic applications in immunity and regenerative medicine. In vivo Imaging, tracking and targeted drug delivery to specific cells, cell tissues and drug resistant bacteria is critical for many diagnostic biotechnologies, vaccine development and drug screening platforms. These research fields and markets are diverse but converge at the ability to rewire (engineer) cell surfaces for specific applications. New general methods that rewire cell surfaces with the capability to control cell interconnectivity in space and time would allow for further exploration of a range of fundamental cell behaviour studies and provide new ways to install imaging probes, advance cell based biotechnologies and accelerate regenerative medicine and tissue engineering based therapies. We have published several seminal papers in this area recently (*J. Am. Chem. Soc., twice in Bioconjugate Chemistry, Angew. Chem. Int. Ed., Nature Sci. Reports, ACS Chem Biol.*) with several of these being highlighted in the journal ***Science and Chemical and Engineering News***. This research was also highlighted in *Drug Delivery News and Tissue Engineering Gadgets*. We have several more publications in this area submitted and under review. This research area will allow for the complete control of tissue interactions and is currently being explored commercially for regenerative medicine and tissue engineering applications.

iii. Developing Novel Polyketoester Biomaterials and Hydrogels.

-- This research program aims to develop new polyketoester polymers and chemoselective hydrogels for a range of biomaterial and tissue engineering applications. We have developed a series of novel polyketoesters that can be molded into films and particles as biodegradable, non-cytotoxic materials for tissue engineering scaffolds and as nanoparticle delivery reagents. We have also developed

programmable hydrogels with control of 3D ligand presentation for studies of cell behaviour and regenerative medicine applications. We have published 10 papers in the last 5 years in this area in top polymer journals (*twice in Macromolecules, Biomacromolecules, Soft Matter, Molecules, Polymer, ChemBioChem, ACS App. Mat and Interf. and Langmuir*). We are currently integrating our expertise in polymers with cell surface engineered cells to generate new hybrid living biomaterials for regenerative biomedical applications.

2. PUBLICATIONS.

Submitted:

- *83. Oxime exchange for multiplex nanoparticle synthesis. **Langmuir**. Submitted.
- *82. Generation and analysis of 3-Dimensional Liver Tissue formed via an Inter-cell Bio-orthogonal Mediated Assembly Process. **Proc. Natl. Acad. Sci.** Submitted.
- *81. Dialdehyde click chemistry for bioconjugation. S. Panah, M.N. Yousaf. **J. Am. Chem. Soc.** Submitted.
- *80. Renewable Indium Tin Oxide Surfaces via Exchange Oxime Conjugation. H. Mak, W. Luo, M.N. Yousaf. **Angew. Chem. Int. Ed.** Submitted.
- *79. Rewiring Cell Surfaces for Multilayer Tissue Assembly. J. Chen, W. Luo, M. N. Yousaf. **Nature Materials**. Submitted.
- *78. Crosslinking Cells with Oxime Cell Surface Engineering. S. Burella, W.Luo, M.N. Yousaf. **J.Am.Chem. Soc.** Submitted.
- *77. The Cell Adhesion Synergy Peptide PHSRN activates GTPases independently of the RGD Peptide to Induce Membrane Protrusions. S. Park, E.J. Lee, A. Dubash and M.N. Yousaf*. **Biochemistry**. Submitted.

Published:

- *76. A Dual Receptor and Reporter for Multi-Modal Cell Surface Engineering. W.Luo, N. P. Westcott, D. Dutta, A. Pulsipher, D. Rogozhnikov, J. Chen, M.N. Yousaf*. **ACS Chemical Biology**, 2015. 10, 2219-2226.

Highlighted in Faculty1000

- *75. Spheroid and Tissue Assembly in Microfluidic Flow. P.J. O'Brien, W. Luo, D. Rogozhnikov, J. Chen, M.N. Yousaf*. **Bioconjugate Chem.** 2015. 26 (9), 1939-1949

Highlighted in Faculty1000

- *74. Developing chemoselective and biodegradable polyester elastomers for bio-scaffold application. D.G. Barrett, W. Luo, M.N. Yousaf*. **J. Mat. Chem. B. RSC.** 2015. (3) 1405-1414.

Short Curriculum Vitae -- Muhammad N. Yousaf

- *73. A Molecular Smart Surface for Spatio-Temporal Studies of Cell Mobility. E.J. Lee, E.W.L. Chan, W. Luo, M. N. Yousaf*. **PLOS ONE** 2015. E0118125
Highlighted in JOVE
- *72. In Situ Modulation of Cell Behavior via Smart Dual Ligand Surfaces. A. Pulsipher, D. Dutta, W. Luo, M. N. Yousaf*. **Langmuir** 30 2014, 13656-13666
- *71. Remote Control of Tissue Interactions via Engineered Photo-switchable Cell Surfaces. W. Luo, A. Pulsipher, D. Dutta, B. M. Lamb, M. N. Yousaf*. **Nature Scientific Reports** 2014, 4, 6313.
Highlighted in Breakthroughs in Cell Gadgets
- *70. Controlling cell behavior with peptide nano-patterns. N. P. Westcott, W. Luo, M. N. Yousaf*. **Journal of Colloid and Interface Science**, 430, 2014, Pages 207-213
- *69. Dynamic 3D cell culture via a chemoselective photoactuated ligand. N. P. Westcott, W. Luo, J. Goldstein, M. N. Yousaf*. **Biointerphases** 9, 031005 2014; <http://dx.doi.org/10.1116/1.4881035>
Highlighted in Association of the Vacuum Society News.
- *68. PI3 kinase enzymology on fluid lipid bilayers. D. Dutta, A. Pulsipher, W. Luo, M. N. Yousaf*. **Analyst**, 139 (2014), 5127-5133
- *67. Cell division orientation on biospecific peptide gradients. B.M. Lamb, W. Luo, S. Nagdas, M.N. Yousaf*. **ACS Appl. Mater. Interf.** 2014, 6, 11523-11528.
- *66. Cell surface engineering by a conjugation and release approach based on the formation and cleavage of oxime linkages upon mild electrochemical oxidation and reduction. A. Pulsipher, D. Dutta, W. Luo, M.N. Yousaf*. **Angew. Chem. Int. Ed.** 2014, 53, 9487-9492.
Highlighted in Highbeam Articles
- *65. Ligand slope, density and affinity direct cell polarity and migration on molecular gradient surfaces. E-J. Lee, E.W.L. Chan, W. Luo, M.N. Yousaf*. **RSC Advances** 2014, 4, 31581-31588.
- *64. A General Chemoselective and Redox Responsive Ligation and Release Strategy. S. Park, N. P. Westcott, W. Luo, B. M. Lamb, M.N. Yousaf*. **Bioconjugate Chemistry**, 2014. 25, 543-551.
- *63. Molecular Gymnastics on Surfaces. W. Luo, S. Burella, S. Morin and M. N. Yousaf* **Angew. Chem. Int. Ed.** 2015. Minireview. in press.
- *62. Electroactive nanoarrays for biospecific ligand mediated studies of cell adhesion, polarization and migration. M. N. Yousaf*. 140 pages. **Book**. Lambert Academic Publishing. Germany. 2014.
- *61. Engineering Cell Surfaces via Liposome Fusion for Tissue Engineering Applications. (**Book Chapter**) For Liposomes, Lipid Bilayers and Model Membranes: From Basic Research to Application. Taylor and Francis. Ed. Norbert Kucerka. D. Dutta, W. Luo, M. N. Yousaf*. 2014. 40 pages.

- *60. Interaction of switchable surfaces with mammalian cells (**Book Chapter**) in Surface Modification of Biomaterials: Switchable and Responsive Surfaces Woodhead publishing. Ed. Jonathan Zhang., W. Luo and M. N. Yousaf* 2014. 36 pages.
- *59. Engineering Cell Surfaces via Liposome Fusion. D. Dutta, A. Pulsipher, W. Luo, M.N. Yousaf*. **Bioconjugate Chemistry**. 2011. 22, 2423-2433.
Highlighted in **Chemical & Engineering News** 2011, 49, 36.
Highlighted in NewsRX, Vertical News.
- *58. Biomolecular modification of carbon nanotubes for studies of cell adhesion and migration. W. Luo, M.N. Yousaf. **Nanotechnology**. 2011. 22, 49. (**Cover Article**) (**Special Issue on Bioengineering Nanotechnology**)
Highlighted in NewsRX (Drug Delivery News, Vertical News (Nanotechnology)).
Highlighted in Global Medical Discovery News.
- *57. Tissue Morphing Control on Dynamic Gradient Surfaces. W. Luo, M.N. Yousaf*. **J. Am. Chem. Soc.** 2011, 133, 10780-10783.
Highlighted in **Chemical & Engineering News** 2011, 29, 27.
- *56. A Redox Switchable Surface for Controlling Peptide Structure. B. M. Lamb, M.N. Yousaf*. **J. Am. Chem. Soc.** 2011, 133, 8870-8873.
- *55. Synthetic Chemoselective Rewiring of Cell Surfaces: Generation of Three-Dimensional Tissue Structures. D. Dutta, A. Pulsipher, W. Luo, M. N. Yousaf*. **J. Am. Chem. Soc.** 2011, 133, 8704-8713.
Highlighted in **Science** 2011, 332, 1011-1012.
- *54. A Renewable, Chemoselective, and Quantitative Ligand Density Spot Microarray for the Study of High-Throughput Biospecific Interactions. A. Pulsipher and M.N. Yousaf*. **Chem. Comm.** 2011. (**Special Issue on Emerging Investigators**) 47, 523-525
- *53. Developing A Self-Assembled Monolayer Microarray to Study Stem Cell Differentiation. W. Luo, M.N. Yousaf*, **J. Coll. Int. Sci.** 2011. 360, 325-330. (**Cover Article**)
- *52. Self-Assembled Monolayers as Dynamic Model Substrates for Cell Biology. Pulsipher, M. N. Yousaf. * **Advances in Polymer Sciences (Bioactive Surfaces)**. Book Chapter. Editors. Borner, Lutz. 2011. 103-134.
- *51. One-Step Syntheses of Photocurable Polyesters Based on a Renewable Resource. D. Barrett, T. Merkel, C. Luft, M.N. Yousaf*. **Macromolecules**. 2010, 43 ,9660–9667
- *50. Thermosets Synthesized by Thermal Polyesterification for Tissue Engineering Applications. D.G. Barrett, M.N. Yousaf*. **Soft Matter (Special Issue on Tissue Engineering)** 2010, 6, 5026 – 5036.
- *49. Microfluidics for Molecular Interaction Assays on Surfaces. B.M. Lamb and M.N. Yousaf*. **Methods in Molecular Biology (Chemical Genomics and Proteomics)**. Book Chapter. Editor. E. Zanders. 2011. in press.

Short Curriculum Vitae -- Muhammad N. Yousaf

- *48. Fabrication of Dynamic Self-Assembled Monolayers for Cell Migration and Adhesion Studies. N. P. Westcott and M.N. Yousaf*. **Methods in Molecular Biology (Bioconjugation Protocols)**. Book Chapter. Editor. S. Mark. 2011. in press.
- *47. Microfluidic Permeation Printing of Self-Assembled Monolayer Gradients on Surfaces for Chemoselective Ligand Immobilization Applied to Cell Adhesion and Polarization B.M. Lamb and M.N. Yousaf*. **Langmuir**. 2010, 26, 12817-12823.
- *46. Selective Tethering of Ligands and Proteins to a Microfluidic Patterned Electroactive Fluid Lipid Bilayer Array. D. Dutta, A. Pulsipher and M.N. Yousaf*. **Langmuir**, 2010. 26, 9835-9841.
- *45. Role of Surface Chemistry and Topology of Chemoselectively Tailored Embossed Films on Shear Adhesion. D. G. Barrett and M.N. Yousaf*. **J. Mat. Chemistry**. 2010, 20, 2813-2819.
- *44. Tandem Surface Microfluidic Lithography and Activation to Generate Patch Pattern Biospecific Ligand and Cell Arrays. A. Pulsipher and M. N. Yousaf*. **Langmuir**, 2010, 26, 4130-4135.
- *43. Aliphatic Polyester Elastomers Derived from Erythritol and α,ω -Diacids. D. G. Barrett and M. N. Yousaf*, **Polymer Chemistry** 2010, 1, 296-302.
- *42. Surface Chemistry and Cell Biological Tools for the Analysis of Cell Adhesion and Cell Migration. A. Pulsipher, M.N. Yousaf*. **ChemBioChem** 2010, 11, 745-753. **(Cover Article)**
- *41. Tailored Electroactive and Quantitative Ligand Density Microarrays Applied to Stem Cell Differentiation. W. Luo, E.W.L. Chan and M.N. Yousaf*. **J. Am. Chem. Soc.** 2010, 132, 2614–2621. **Highlighted in J. Am. Chem. Soc.** 2011, 133, 167-169. **(JACS SELECTS #11)**
- *40. Design and Applications of Biodegradable Polyester Tissue Scaffolds Based on Endogenous Monomers Found in Human Metabolism. D. G. Barrett, M. N. Yousaf*. **Molecules** 2009, 14, 4022-4050
- *39. Patterned Hybrid Nanohole Array Surfaces for Cell Adhesion and Migration. N. P. Westcott, Y. Lou, J. F. Muth and M. N. Yousaf*. **Langmuir** 2009, 25, 11236–11238.
- *38. Spatio-Temporal Control of Cell-Cell Interactions on Surfaces. E.J. Lee, E.W.L. Chan, M.N. Yousaf*. **ChemBioChem** 2009, 10, 1648-1653.
- *37. Chemoselective Ligand Patterning of Electroactive Surfaces using Microfluidics. N. P. Westcott, M. N. Yousaf*. **Electrophoresis** 2009, 30, 3381-3385. **(Cover Article)**
- *36. Electrochemical and Chemical Microfluidic Gold Etching to Generate Patterned and Gradient Substrates for Cell Adhesion and Cell Migration. N. P. Westcott, B.M. Lamb, M.N. Yousaf*. **Analytical Chem.** 2009. 81, 3297–3303.
- *35. Rapid In-Situ Generation of Two Patterned Chemoselective Orthogonal Surface Chemistries from a Single Hydroxy-Terminated Surface Using Controlled Microfluidic Oxidation. A. Pulsipher, N.P. Westcott, W. Luo, M.N. Yousaf*. **J. Am. Chem. Soc.** 2009. 131, 7626–7632.

- *34. Model Systems for Cell Mobility. M.N. Yousaf*. **Curr. Opin. Chem. Bio.** 2009, 13, 697-704.
- *33. Tailored Electroactive Nanorods for Biospecific Cell Adhesion and Differentiation. W. Luo, M.N. Yousaf*. **Chem. Comm.** 2009, 10, 1237-1239.
- *32. Rapid Microfluidic Generation of Patterned Aldehydes from Hydroxy Terminated SAMs for Ligand and Cell Immobilization on Optically Transparent Indium Tin Oxide (ITO) Surfaces. A. Pulsipher, N.P. Westcott, W. Luo, M.N. Yousaf*. **Adv. Materials.** 2009, 21, 3082-3086.
- *31. Total Internal Reflection Fluorescence Microscopy of Cell Adhesion on Patterned Self-Assembled Monolayers on Gold. D. Hoover, E.J. Lee, M.N. Yousaf*. **Langmuir** 2009, 25, 2563-2566.
- *30. Geometric Control of Stem Cell Differentiation Rate on Surfaces. W. Luo, S. Jones, and M. N. Yousaf*. **Langmuir** 2008, 24, 1229-1233.
- *29. An Electroactive Catalytic Dynamic Substrate that Immobilizes and Releases Patterned Ligands, Proteins and Cells. E.W.L. Chan, S. Park, M.N. Yousaf *. **Angew. Chem. Int. Ed.** 2008, 47, 6267-6271.
- *28. Renewable and Optically Transparent Electroactive Indium Tin Oxide (ITO) Surfaces for Chemoselective Ligand Immobilization and Biospecific Cell Adhesion. W. Luo, N. P. Westcott, A. Pulsipher, and M. N. Yousaf*. **Langmuir** 2008, 24, 13096-13101.
- *27. Poly(triol- α -ketoglutarate) as Biodegradable, Chemoselective, and Mechanically Tunable Elastomers. D.G. Barrett and M.N. Yousaf*. **Macromolecules** 2008, 41, 6347-6352.
- *26. Microfluidic Lithography to Create Dynamic Gradient SAM Surfaces for Directed Cell Migration. B. M. Lamb, N. P. Westcott, M. N. Yousaf*. **ChemBioChem** 2008, 9, 2628-2632.
- *25. Expedient Generation of Patterned Surface Aldehydes by Microfluidic Oxidation for Chemoselective Immobilization of Ligands and Cells. N. P. Westcott, A. Pulsipher, B. M. Lamb, M. N. Yousaf*. **Langmuir** 2008, 24, 9237-9240.
- *24. Asymmetric Peptide Nanoarray Surfaces for Studies of Single Cell Polarization. D.K. Hoover, E.W.L. Chan and M.N. Yousaf*. **J. Am. Chem. Soc.** 2008, 130, 3280-3281.
Highlighted in Faculty of 1000.
- *23. Live-Cell Fluorescence Microscopy of Directed Cell Migration on Partially Etched Electroactive SAM Gold Surfaces. B.M. Lamb, N.P. Westcott, M.N. Yousaf*. **ChemBioChem** 2008, 9, 2220-4.
- *22. Microfluidic Etching and Oxime-Based Tailoring of Biodegradable Polyketoesters. D.G. Barrett, B.M. Lamb, M. N. Yousaf*. **Langmuir** 2008, 24, 9861-9867.
- *21. Microfluidic Lithography of SAMs on Gold to Create Dynamic Surfaces for Directed Cell Migration and Contiguous Cell Co-Cultures. B.M. Lamb, D.G. Barrett, N.P. Westcott, M. N. Yousaf*. **Langmuir** 2008, 24, 8885-9.

- *20. Preparation of a Class of Versatile, Chemoselective, and Amorphous Polyketoesters D. G. Barrett and M. N. Yousaf*. **Biomacromolecules** 2008, 9, 2029-2035.
- *19. An Interfacial Oxime Reaction to Immobilize Ligands and Cells in Patterns and Gradients to Photo-Active Surfaces. S. Park, M.N. Yousaf*. **Langmuir** 2008, 24, 6201-6207.
- *18. A Photo-Electroactive Surface Strategy for Immobilizing Ligands in Patterns and Gradients for Studies of Cell Polarization. E.W.L. Chan and M.N. Yousaf*. **Mol. BioSys.** 2008, 4, 746-753.
- *17. Synergistic Microfluidic and Electrochemical Strategy to Activate and Pattern Surfaces Selectively with Ligands and Cells. N.P. Westcott and M.N. Yousaf*. **Langmuir** 2008, 24, 2261-2265.
- *16. A Tunable, Chemoselective and Moldable Biodegradable Polyester for Cell Scaffolds. D.G. Barrett and M.N. Yousaf*. **ChemBioChem.** 2008, 9, 62-66.
- *15. Combining Surface Chemistry with a FRET-Based Biosensor to Study the Dynamics of RhoA GTPase Activation in Cells on Patterned Substrates. L.Hodgson, E.W.L. Chan, K.M. Hahn and M.N. Yousaf*. **J. Am. Chem. Soc.** 2007, 129, 9264-9265.
- *14. Rapid Patterning of Cells and Cell Co-Cultures with Spatial and Temporal Control on Surfaces through Centrifugation. D.G. Barrett and M.N. Yousaf*. **Angew. Chem. Int. Ed.** 2007, 46, 7437-7439.
- *13. Surface-Chemistry Control to Silence Gene Expression in Drosophila Schneider 2 Cells through RNA Interference. E.W.L. Chan and M.N. Yousaf*. **Angew. Chem. Int. Ed.** 2007, 46, 3881-3884.
- *12. Electroactive nanoarrays for Biospecific Ligand Mediated Cell Adhesion. D.K. Hoover, E.J. Lee, E.W.L. Chan and M.N. Yousaf*. **ChemBioChem** 2007, 8, 1920-1923.
- *11. Site-Selective Immobilization of Ligands with Control of Density on Electroactive Microelectrode Arrays. E.W.L. Chan and M.N. Yousaf*. **ChemPhysChem** 2007, 8, 1469-1472.
- *10. Selective Immobilization of Ligands, Proteins and Cells to Electroactive Surfaces. E.W.L. Chan and M.N. Yousaf*. **J. Am. Chem. Soc.** 2006, 128, 15542-15546.
Highlighted in Faculty of 1000. Nanowerks.
9. A Photochemical Method for Patterning the Immobilization of Ligands and Cells to Self-Assembled Monolayers W. S. Dillmore, M.N. Yousaf and M. Mrksich **Langmuir** 2004, 20, 7223-7231.
8. Dynamic Interfaces Between Cells and Surfaces: Electroactive Substrates that Sequentially Release and Attach Cells. W.S. Yeo, M.N. Yousaf, M. Mrksich. **J. Am. Chem. Soc.**, 2003, 125, 14994-14995.
Featured in: News of the Week, **Chemical Engineering News** 2003, 81, 11
7. Using Electroactive Substrates to Pattern the Attachment of Two Different Cell Types. M.N. Yousaf, B.T. Houseman and M. Mrksich **Proc. Natl. Acad. Sci. (USA)** 2001, 98, 5992-5996.

Short Curriculum Vitae -- Muhammad N. Yousaf

6. Turning on Cell Growth with Electroactive Substrates. M.N. Yousaf, B.T. Houseman and M. Mrksich **Angew. Chem. Int. Ed.** 2001, 40, 1093.

Featured in: News of the Week, **Science** 2000, 1477

Nature News Wire March 27, 2001.

News of the Week, **Chemical and Engineering News** 2001, 79, 13

5. Understanding the Role of Adsorption in the Reaction of Cyclopentadiene with an Immobilized Dienophile. E.W.L. Chan, M.N. Yousaf and M. Mrksich **J. Phys. Chem. A.** 2000, 104, 9315.

4. The Kinetic Order of an Interfacial Diels-Alder Reaction Depends on the Environment of the Immobilized Dienophile. M.N. Yousaf, E.W.L. Chan and M. Mrksich **Angew. Chem. Int. Ed.** 2000, 39, 1943.

3. Diels-Alder Reaction for the Selective Immobilization of Protein to Electroactive Substrates. M.N. Yousaf and M. Mrksich **J. Am. Chem. Soc.** 1999, 121, 4286.

Featured in: **Science** Concentrates, **Chemical and Engineering News** 1999, 77, 11

2. Modulating the Behaviors of Attached Cells with Dynamic Substrates. M.N. Yousaf and M. Mrksich **New Technologies for Life Sciences. A Trends Guide.** 2000, 28-35.

1. Copper (II) complexes of bis(1,4,7-triazacyclononane) ligands with polymethylene bridging groups: An equilibrium and structural study. R. Haidar, M. Ipek, M.N. Yousaf and L.J. Zompa. **Inorg. Chem.**, 1997, 36, 3125.

PATENTS.

1. World Intellectual Property Patent (International Application #: PCT/US2004/009376) regarding the Determination of Proteins and/or other Molecules Using MALDI Mass Spectroscopy.

2. Compositions and methods for promoting liposomal and cellular adhesion. US Patent No. 9,080,144 issued July 14, 2015.

3. Compounds for promoting liposomal and cellular adhesion and compositions and methods of use thereof for transfection. (Submitted 2013).

4. Compositions and methods for promoting bioconjugation through dialdehyde ligation (Submitted 2014).

FUNDING.

1. Developing Lipid Surfaces for Studies of Membrane Enzymology and Actin Assembly.

Burroughs Wellcome Foundation. Interface Career Award (2006-2011) \$600,000

2. Carolina Center for Cancer Nanotechnology. National Cancer Institute (2005-2012) \$1,050,000

3. Energy Frontiers Research Center. Department of Energy. (2008-2012). \$ 400,000

4. Dynamic Surfaces for Studies of Cell Behavior. National Science Foundation (2009-2014) \$600,000

5. The Development and Application of Dynamic Smart Surfaces. National Science and Engineering Council (NSERC) Discovery Grant. 2012-2017. \$ 350,000

6. The Development and Application of Dynamic Smart Surfaces. National Science and Engineering Council (NSERC) Discovery Grant Accelerator Award (DAS) 2012-2014. \$120,000

7. Advanced Biomolecular Materials Laboratory. Canadian Foundation for Innovation – Leaders Opportunity Fund. 2012. \$387,000

Short Curriculum Vitae -- Muhammad N. Yousaf

8. NSERC CREATE training program in manufacturing, materials and mimetics. (University of Toronto, McMaster University, York University). \$1,500,000
9. York University Research Chair. 2015-2019. \$500,000
10. Ontario Institute of Regenerative Medicine 2016. \$50,000
11. Krembil Foundation 2016-2018. \$420,000
12. Engage Grant (Bio-Rad) 2016. \$20,000

Start-up Company - (OrganoLinx Inc.) initiated to commercialize technology developed out of Yousaf research laboratory. Focus is on providing reagents for assembly of **a.** spheroids **b.** tissues **c.** transfection of nucleic acids to mammalian cells (reagents) **d.** organ chips (for drug screening) **d.** dialdehyde bioconjugation reagents for imaging and protein/ligand conjugation.

3. Highly Qualified Personnel (HQP)

Since 2005 I have trained over 80 HQP. Many of my students have won university, state and national US awards for their research. Several high school students are now at the very best institutions in the US (Univ. Pennsylvania, Stanford, Harvard, MIT). Several undergraduate students in my laboratory have gone on to top medical, dental and chemistry graduate programs in the US (UC Berkeley, U. Florida, NYU, Tufts, Washington Univ. St. Louis, etc.). Several of my graduate students are now in faculty positions or postdocs in the best labs and institutions (Caltech, Scripps, Columbia, NYU, Northwestern, Rockefeller).

A Short list of Student Awards from my laboratory:

Postdoctoral Fellows: Eugene Chan: UNC Burroughs Wellcome Interface Award Nominee. Wei Luo: York University Banting PDF Nominee.

Graduate Students: Devin Barrett: UNC Dissertation Fellowship, UNC IMPACT award, IBNAM-Baxter Postdoc fellowship. Nathan Westcott: UNC Energy Fellowship, UNC Dissertation Award, Mentor Award. Abigail Pulsipher: NSF representative to Linda Nobel Laureate Fellow to Attend Lindau Meeting in Germany. UNC IMPACT Award. NIH Postdoctoral fellowship. Brian Lamb: UNC Dissertation Fellowship, Mentor Award, NIH Postdoctoral fellowship.

Undergraduate Students: Stephanie Jones: Merck Travel Award, UNC Chem. Dept. Undergrad. Award, Barry Goldwater Fellowship, Churchill Scholar (Cambridge, England), NSF graduate Fellowship. Amy Kim – Westinghouse National Semifinalist. Eric Xu – Westinghouse National Semifinalist. Joshua Womack – Project SEED from the Amer. Chem. Soc. Edmond Chiu (NSERC USRA), Shoukoufeh Hyaseri (NSERC, USRA). Sina Elahipanah (OGS).

Short List of Former Group Members (from over 80 HQP)

Diana Hoover (PhD) Professor at Seton Hill University
Eric Xu (B.Sc) Graduate Student at Harvard University (MA)
Samantha Chu (B.Sc) Graduate Student at Stanford University (CA)
Kimberly Clark (B.Sc) Graduate Student at Duke University (NC)
Kunal Kandimalla (B.Sc) Graduate Student at University of Pennsylvania (PA)
Jeffrey Goldstein (B.Sc) Medical Student at Washington Univ. St. Louis (MO)
Debjit Dutta (PhD) Postdoctoral Fellow at Columbia University (NY)
Abigail Pulsipher (PhD) Postdoctoral Fellow at California Institute of Technology (CA)
Nathan Westcott (PhD) Postdoctoral Fellow at Rockefeller (NY)
Brian Lamb (PhD) Postdoctoral Fellow at Scripps Research Institute (CA)
Stephanie Jones (B.Sc) Graduate Student at UC Berkeley (CA)

Short Curriculum Vitae -- Muhammad N. Yousaf

Joshua Womack (B.Sc) Undergraduate at UNC Chapel Hill (NC)
Jason Vargheese (B.Sc) Medical Student at Emory University (GA)
Devin Barrett (PhD) Postdoctoral Fellow at Northwestern University (IL)
Sungjin Park (PhD) Postdoctoral Fellow at Northwestern University (IL)
Wei Luo (PhD) Postdoctoral Fellow at York University (ON)
Suri On (B.Sc) Dental Student at UNC Chapel Hill (NC)
Khurram Tariq (B.Sc) Medical Student Emory University (GA)
Eun-Ju Lee (PhD) Scientist at ASRO (Australia)
Muhanned Salem (B.Sc) Dental Student at Tufts University (MA)
Eugene Chan (Postdoctoral Fellow) Senior Scientist – Director of Surface Chemistry IDEXX (ME)
Joshua Davis (B.Sc) Medical Student at UNC Chapel Hill (NC)
David Liu (B.Sc) Graduate Student at MIT (MA)
Tina Searcey (M.Sc) Graduate Student at Northwestern (IL)
Wyetta Palmby (M.Sc) Scientist Kendle Diagnostics
Wei Luo (PhD) Bio-Rad (Toronto, Canada)
Rana Shahla (B.Sc) Apotex (Toronto, Canada)

7. PROFESSIONAL SERVICE

Editorial Boards

1. International Advisory Board for ACS Sensors
2. Editor in Chief for Journal of Bio-orthogonal chemistry (launch 2016).
3. Editor for Journal of Biointerphases,
4. Editor for Journal of Biochips and Tissue Chips.
5. Editor for Journal of Biotechnology and Biomaterials.
6. Editor for Methods in Molecular Biology (Springer-Book) on Cell Mobility.
7. Editor for Special Issue of Analytical Chemistry Journal on Biosurfaces.

Peer Review

--Journals

Nature, Science, PNAS, Nature Materials, Nature Chemistry, Biomaterials, Journal of the American Chemical Society, Angewandte Chemie Int. Ed., Macromolecules, Biomacromolecules, Langmuir, Analytical Chemistry, Analyst, Analytical Biochemistry, J. Physical Chemistry A and B, Biophysical Journal, Soft Matter, ChemBioChem, Accounts of Chemical Research, Chemical Communications, Small, Nanoletters, Nanomedicine, Biointerphases, Chem. Soc. Rev., ACS Chemical Biology, Chemistry and Biology, Small, Nanoletters, ACS Nano, Biomaterials, Chemistry European Journal, J. of Biomedical Materials Research, Lab on a Chip, Etc....(Review over 40 papers/year).

--Grant Agencies (Reviewer)

Centers for Cancer Nanotechnology Excellence (CCNE) National Cancer Institute (USA), (2015-2016)
NSERC Discovery Grant (Canada) Reviewer (2012-2015)
NSERC RTI Grant (Canada) Reviewer (2013-2015)
Canadian Foundation for Innovation (CFI –LOF) 2013-2015)
Ontario Graduate Scholarship Panel (2012-2014)
NSF CAREER Award panel (2011, 2012-2015)
NSF SBIR Phase I panel (2011, 2012, 2014, 2015) (Business grants) Life Science Tools.
NSF SBIR Phase II panel (2012, 2014) (Business grants) Life Science Tools.

Short Curriculum Vitae -- Muhammad N. Yousaf

NSF grant chemistry panel (2007, 2008, 2009, 2010, 2011,)
Department of Energy (2010, 2014) Energy Frontiers Research Centers
NIH (enabling technologies) (2009, 2010, 2014)
NIH (Bioengineering) (2007, 2008, 2009, 2010)
Dutch Technology Foundation (VENI grants) (2012)
MRC (UK) Medical Technology Grants (2012)
Hong Kong Research Grants (2006-2011)

8. PUBLIC APPEARANCES

Invited Seminars and Presentations (2005-2015) Presented over 200 invited Seminars at Universities and Conferences.

Short List of Recent Presentations: Caltech, Cornell, Northwestern, Univ. Chicago, UC San Diego, Georgia Tech, Emory, Univ. Illinois UC, Scripps, Princeton. Harvard, Columbia Univ. (NY), UC Santa Barbara, Stanford, Washington Univ., Univ. Minnesota, MIT, Gordon Research Conference on Nanotechnology : Univ. Penn., Johns Hopkins, Windsor, McMaster, Univ. Kansas. Univ. Toronto, Waterloo, Rockefeller, UCLA, ACS – San Diego, Gordon Conference on Bio-Interfaces, Canadian Chemical Society (Calgary), Ontario on a Chip, Chemical Biophysics Symposium (Toronto), U Alberta. McGill, Western Univ., KAIST (Korea), Marie Curie Institute (Paris, France), CNRS –Gif Sur Yvette (France). Univ. Tokyo (Japan). IIT Bombay (India), IIT Delhi (India), UC Irvine, UC Berkeley, UCLA, Boston College, UMass Amherst, UTexas Austin, CSC Ottawa, ACS Boston, Pacificchem 2015 Etc..

Invited to over 50 university seminars, company seminars and conferences per year.

TEACHING

UNC Chapel Hill:

2006 Instructor for General Chemistry 102, 1st year undergraduate course (230 students)
2007 Instructor for Biochemistry 436: Interactome and Proteome in Biology (graduate course: 34 students)
2007 Instructor for Chemistry 733: Nanobiotechnology (graduate course: 5 students)
2008 Instructor for Biochemistry 431, (4th year undergraduate course: 70 students)
2009 Instructor for General Chemistry 102, 1st year undergraduate course (210 students)
2010 Co-Instructor for Cell Biology, 644 (Medical School) (graduate course: 60 students)

York University:

2011, 2013 Instructor for Chem 2020: Organic Chemistry (undergraduate course: 250 students)
2011 Chem 1000: 1st year general chemistry (help room faculty advisor)
2012-2014 Instructor for Chem 4023/5010: Physical Organic Chemistry (undergrad/grad course)
2012 Guest Lecturer for Biol 4290: Advanced Biotechnology
2012 Guest Lecturer for Chem 3400: Pharmaceutical Chemistry
2012-2015 Chem 1000; 1st year general chemistry (help room faculty advisor)

SERVICE

Advisory Board for NIH (USA) NanoCancer Centers of Excellence (only Canadian member)

UNC Chapel Hill (2005-2011)

Organic faculty search committee 2007, 2008 (hired Erik Alexanian).

Seminar series coordinator 2008, 2009

Short Curriculum Vitae -- Muhammad N. Yousaf

Endowed lectureship committee 2008, 2009, 2010

Graduate Admissions committee (Chemistry), 2009, 2010

Graduate Admissions committee (Biological and Biomedical Sciences – Medical School) 2008,2009

Served on 32 PhD and MSc. Dissertation Defenses.

York University: (Faculty of Science and Engineering (FSE)) (2011-)

Senate Tenure and Promotions Committee (2013-2016)

Faculty of Science Appeals Committee (2012-2013)

Faculty of Science Petitions Committee (2012-2013)

Faculty of Science Task Force (2012)

Sanofi Bioscience High School Science Competition Judge (2012, 2013, 2015)

- Chair of the Chemistry Department (07/2012-06/2015)

Petitions Committee (FSE - Undergraduate) (2012-2013)

York Chemical Society (YCS) Faculty Advisor for Undergraduates. (2011-2014)

University Fair (Ontario) – held in Toronto 2011-2014).

York University Science Teacher Night (2011-2014)

Seminar coordinator (Chemistry) (2011-2012)

Chemistry Chair Search Committee 2012

Faculty Search Committee (Materials) 2011. Hired Jennifer Chen

Awards Nomination Committee (Chemistry) 2012-

NMR Users Committee (Chemistry) 2011

York University Spring Open House 2012-2014 (for Highschool students)

Bethune Faculty Fellow (2011-)

Canada-India Frontiers Symposium (York University) 2012

Canada-China Analytical Chemistry Conference (Toronto Convention Centre) 2013

Featured in York FSE Research Focus 2012

Life Science Research Building Procurement Committee. 2012-2013

York University NSERC Steacie Nominee 2012

Faculty Advisor (York University) for Banting Postdoc Nominee (Wei Luo)

Served on 12 PhD committees at York (Chemistry, Biology)

Ontario Graduate Scholarship (OGS) Committee (2012-2014)

NSERC Discovery Grant Reviewer (2012-2015)

Sanofi BioGeNEius Challenge Canada HighSchool Science Judge (2011-2015)

Short Curriculum Vitae -- Muhammad N. Yousaf

Faculty of Science and Engineering Future of Science Task Force

Faculty of Science and Engineering Leadership Committee (2012-2015)

York University Senate (2012-2015)

FSE Scholars Evening Workshop for High Performing High School Students (2011-2013)

FSE Spring Open House for Undergraduates

- Served as reviewer on over 40 MSc and PhD. Dissertations.
- Worked with advancement on numerous outreach programs for York University FSE
- Worked with York Innovation and MARS innovation to patent research and to launch a company (Organolinx Therapeutics) to commercialize research for bio-orthogonal transfection and tissue engineering applications.

References:

Prof. Bruce Lennox
Department of Chemistry
McGill University
bruce.lennox@mcgill.ca

Prof. Molly Schoichet
Department of Chemical Engineering and IBBME
University of Toronto
molly.shoichet@utoronto.ca

Prof. Milan Mrksich
Department of Chemistry
University of Chicago
Chicago, IL 60637
Tel: 773-702-1651
mmrksich@uchicago.edu

Prof. M.G. Finn
Department of Chemistry and the
Skaggs Institute for Chemical Biology
The Scripps Research Institute
10550 N. Torrey Pines Rd., CB-248
La Jolla, CA 92037
mgfinn@scripps.edu

Prof. Chad Mirkin
Department of Chemistry
Northwestern University
2145 Sheridan Road
Evanston, IL 60208-3113
chadnano@northwestern.edu

Short Curriculum Vitae -- Muhammad N. Yousaf

Prof. Carolyn Bertozzi
Department of Chemistry
Stanford University
bertozzi@stanford.edu

Prof. Andres Garcia (Biomaterials, Bioengineering)
Department of Chemical Engineering and Material Science
Georgia Institute of Technology
Atlanta, Georgia
Andres.garcia@me.gatech.edu

Prof. Kevin Plaxco (Surface Chemistry, Chemical Biology, Nanoscience)
Department of Chemistry and Biochemistry
University of California, Santa Barbara
Santa Barbara, CA 93106 -9510
kwp@chem.ucsb.edu

Prof. Mark Wightman
Department of Chemistry
UNC Chapel Hill
Chapel Hill, NC, 27599
rmw@unc.edu
919-962-1472

Prof. Wenbin Lin
Department of Chemistry
University of Chicago
Chicago, IL
wenbinlin@uchicago.edu
773-834-7163