YORK UNIVERSITÉ UNIVERSITY

redefine THE POSSIBLE.

Specialized Honours Chemistry with Special Focus on

Materials Chemistry

The traditional boundaries separating the many sub-disciplines in Chemistry have been blurring. Modern Chemistry demands a broader education and outlook. Chemists now explore multi-disciplinary areas of Science and our undergraduate programs reflect this need. Indeed, hybrid areas, such as biological chemistry, materials chemistry and analytical chemistry, are among the hottest research areas. This is truly an exciting time to study chemistry and we have devised study plans for students wishing to focus on one of these multi-disciplinary areas. The following describes one of these three areas, and the study plan is given overleaf.

What is Materials Chemistry?

If one were to predict which will be the most important areas of Chemistry over the next quarter-century, Materials Chemistry stands out. Wherever we are in the modern world, we are surrounded by materials fabricated by chemists, from the mundane paint on the wall to the sophistication of light-weight computers and flat television screens. The science-fiction dreams of yesteryear are the reality of today, thanks to Materials Chemists.

Modern-day surgeons are now grafting new biomaterials like Cyberskin onto burns to heal them faster and scar-free. Liquid crystals now make flat-screen TV an affordable reality. Fighter pilots rely on information displayed on their visors, thanks to modern electro-luminescent materials. New advances in composite materials make skis, tennis rackets and bicycles lighter, stronger and gold-medal winners.

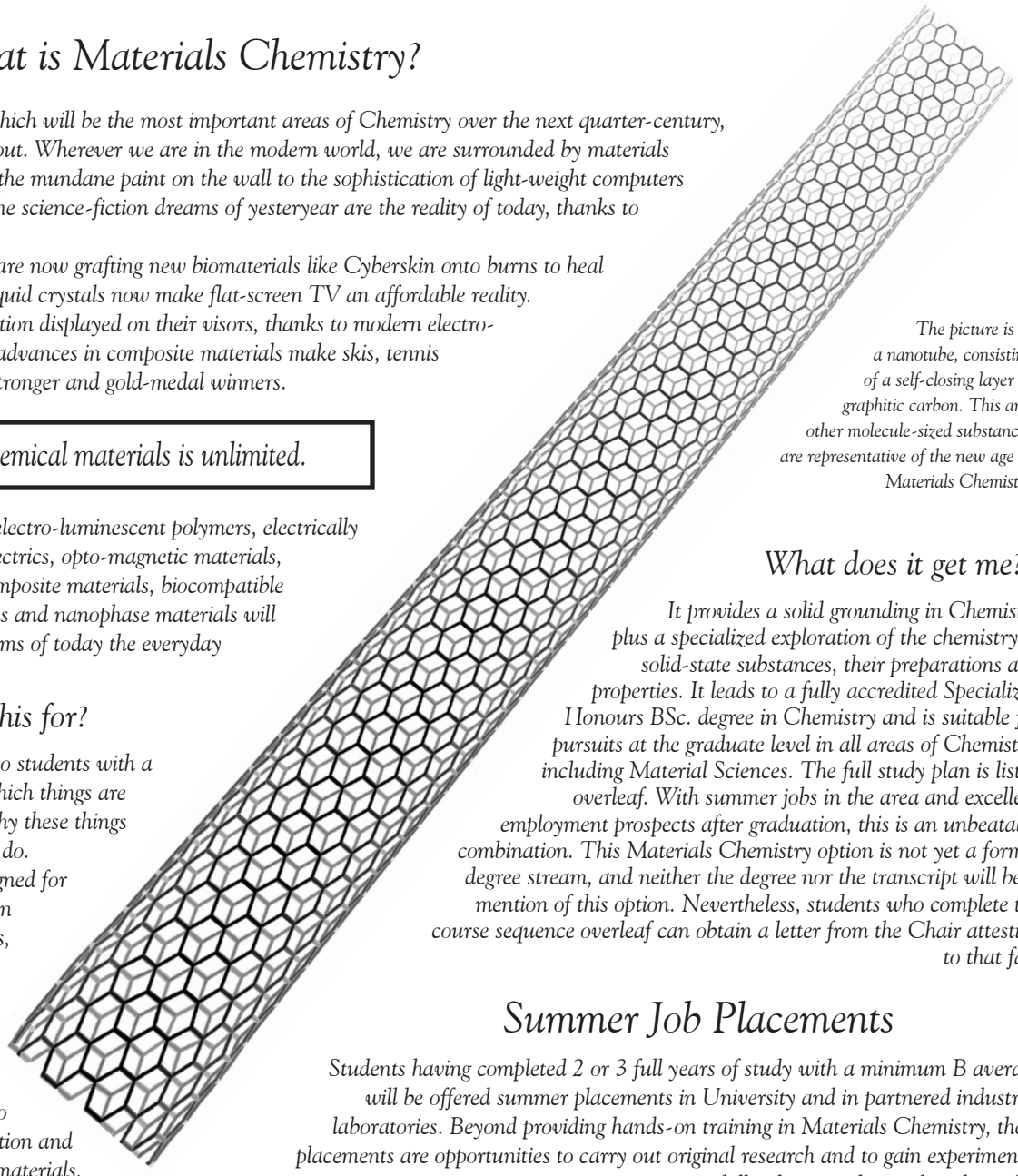
The future of chemical materials is unlimited.

Today's research into electro-luminescent polymers, electrically conductive polymers, piezoelectrics, opto-magnetic materials, electrocatalytic materials, composite materials, biocompatible materials, surface interactions and nanophase materials will make the science-fiction dreams of today the everyday realities of tomorrow.

Who is this for?

This area will appeal to students with a curiosity about the stuff of which things are made, and about how and why these things look, feel and behave as they do.

The study plan is designed for those students with interests in polymers, electronic materials, optical materials, magnetic materials, surface chemistry, biosensors and/or biomaterials, crystallography and other aspects of chemistry related to the preparation, characterization and use of specialized solid-state materials.



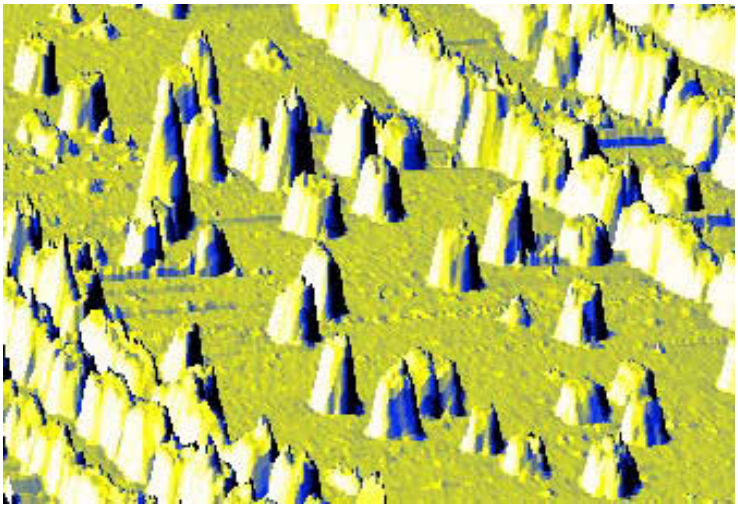
The picture is of a nanotube, consisting of a self-closing layer of graphitic carbon. This and other molecule-sized substances are representative of the new age in Materials Chemistry.

What does it get me?

It provides a solid grounding in Chemistry plus a specialized exploration of the chemistry of solid-state substances, their preparations and properties. It leads to a fully accredited Specialized Honours BSc. degree in Chemistry and is suitable for pursuits at the graduate level in all areas of Chemistry, including Material Sciences. The full study plan is listed overleaf. With summer jobs in the area and excellent employment prospects after graduation, this is an unbeatable combination. This Materials Chemistry option is not yet a formal degree stream, and neither the degree nor the transcript will bear mention of this option. Nevertheless, students who complete the course sequence overleaf can obtain a letter from the Chair attesting to that fact.

Summer Job Placements

Students having completed 2 or 3 full years of study with a minimum B average will be offered summer placements in University and in partnered industrial laboratories. Beyond providing hands-on training in Materials Chemistry, these placements are opportunities to carry out original research and to gain experimental skills of great value in the job market.



Scanning Tunneling Microscopy (STM) image of nickel nanoclusters on a silver surface.

Second-year Chemistry student Natasha Patrito learning Atomic Force Microscopy (AFM) in Prof. Morin's lab. For more information, see www.chem.yorku.ca/profs/morin.

Need more information?

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Materials Chemistry
The Study Plan

Updated for 2006-2007

YEAR 1
- *SC/CHEM 1000 3.0 ¶ Chemical Structure*
- *SC/CHEM 1001 3.0 ¶ Chemical Dynamics*
- *SC/PHYS 1010 6.0 * Physics*
  or SC/PHYS 1410 6.0 Physical Science
- *SC/CSE 1540 3.0 † Computer Use for the Natural Sciences*
  or SC/CSE 1020 3.0 † Introduction to Computer Science I
  or SC/CSE 1520 3.0 † Introduction to Computer Use I
  or SC/CSE 1530 3.0 † Introduction to Computer Use II
- *SC/BIOL 1010 6.0 Biological Science*
  or SC/EATS 1010 3.0 The Dynamic Earth and Space Geodesy
  with SC/EATS 1011 3.0 Introduction to Atmospheric Science
- *SC/MATH 1013 3.0 Applied Calculus I*
- *SC/MATH 1014 3.0 Applied Calculus II*

YEAR 2
- *SC/CHEM 2010 3.0 Symmetry, Electronic Structure and Bonding*
- *SC/CHEM 2011 3.0 Introduction to Thermodynamics*
- *SC/CHEM 2020 6.0 ¶ Organic Chemistry*
- *SC/CHEM 2030 3.0 § Basic Inorganic Chemistry*
- *SC/CHEM 2050 4.0 ‡ Introductory Biochemistry*
- *SC/CHEM 2080 4.0 Analytical Chemistry*
- *SC/MATH 2015 3.0 Applied Multivariate and Vector Calculus*
  or SC/MATH 2270 3.0 Differential Equations

YEAR 3
- *SC/CHEM 3010 4.0 Physical Chemistry*
- *SC/CHEM 3011 4.0 Physical Chemistry*
- *SC/CHEM 3020 4.0 Organic Chemistry II*
- *SC/CHEM 3030 4.0 Transition Metal Chemistry*
- *SC/CHEM 3031 4.0 Physical Inorganic Chemistry*
- *SC/CHEM 3080 4.0 Instrumental Methods of Chemical Analysis*
- *SC/CHEM 3090 3.0 Introduction to Polymer Chemistry*

YEAR 4
- *SC/CHEM 4000 8.0 ¶ Research Project*
- *SC/CHEM 4090 3.0 Topics in Materials Sciences*

IN ADDITION
- *GENERAL EDUCATION - 12 credits*
- *At least six (6) additional 4000-level CHEM credits.‡*
- *Additional elective courses needed for a minimum overall total of 120 credits.§*

** Requires SC/MATH 1025 3.0¶ or equivalent as co-requisite.*
† SC/CSE courses were formerly labelled SC/COSC.
¶ Usually also available in summer terms. Other departments also offer summer courses.
§ Students having taken SC/CHEM 2030 4.0 (before Fall 2006) will need one fewer elective credit for a 120-credit degree.
‡ Students enrolled before Fall 2006 need not take SC/CHEM 2050 4.0 but are normally required to have at least seven (7) additional 4000-level CHEM elective credits. However, the Department of Chemistry will waive the requirement for 7 additional 4000-level CHEM elective credits for those students having only 6 and lacking SC/CHEM 2050 4.0, but otherwise having met all other pre-2006 requirements and eligible to graduate. This waiver will be issued after graduating students apply to graduate. Consult the Undergraduate Program Assistant for details and procedure.