Chemistry 9674A: Spectroscopy and Microscopy in Materials Research

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Pre-requisite: Knowledge of physical chemistry concepts (quantum mechanics, Spectroscopy, light-matter interaction) are desirable.

Lecture: Three hours per week.

When/Where?: Thursday and Fridays. 2:00-3:30, MSA 3204
Start date : September 22 nd.

Weight: 0.5

Description: Photons are commonly use as a source to probe different properties of materials. Beyond the traditional techniques such as UV-Vis or FTIR spectroscopies, light can also be used to determine orientation properties, birefringence, circular or linear dichroism in the Visible or infrared range through a variety of experimental techniques to study surfaces or bulk properties of an oriented material. Such results can be modeled and compared to predicted structures which is of great interest in particular for complex signals obtained in circular dichroism measurements.
Furthermore, most of optical techniques can be coupled to optical microscopy opening a new window on micro and nanoscale characterization using photon source.
We will review here: the properties of light: energy, polarization phase its application to common characterization techniques: UV-Vis, FTIR, Raman, non linear optical processes, birefringence, circular dichroism, linear dichroism, surface and interface molecular characterization with polarization modulation spectroscopy its application to microscopy: limit of resolution of classical microscopy, confocal microscopy, near field microscopy...

Schedule: This half course will begin in mid September 2016.

Evaluation: 3 problem sets (due 1 week after the date of the assignment) 50%.
1 Short essay (5 pages) on a contemporary topic of advanced spectroscopy technique 20%.
1 Short presentation on the essay topic (~10 -15 min.) 30%.

Reference Books:
No textbook is required. Lecture notes and handouts will be provided from time to time.

Statement on Academic Offences
The statement: “Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:
http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_grad.pdf