Chem868 in Spring 2014 – Surface Analysis, modern instrumentation methods and techniques

Objectives for Chemistry Research Seminars:

- To introduce students a range of modern instrumentation methods and techniques.
- To engage student in self-learning.

This is a three-credit course.

Times: Tuesday 6:00-8:50 PM. The following is a tentative schedule, and subject to changes.

Lecturer:

Dr. F. Ji, Chem. Dep. Disqué 507, Phone: 215-895-2562. Email: hj56@drexel.edu

Office hours: Monday 10am-noon.

Grading policy:

Attendance is required. Miss once without documented excuses will result in loss of 3 points. Your grade will be based on your tests (60%, two tests and 30% each), presentation (30%), and attendance (10%).

Contents:

1. Techniques of analysis
2. Principles of spectroscopy
3. X-Ray Spectroscopy and XPS
4. Electron diffraction (combined with SEM)
5. Molecular luminescence, fluorometry and phsophorimetry
6. Neutron diffraction (optional)
7. Thermogravimetric analysis (TGA) and Differential thermal analysis (DTA) + micro DTA
8. Vibrational (Infrared) spectroscopy (optional) *Attenuated total reflectance spectroscopy*
9. Raman Spectroscopy (optional) *Surface enhanced Raman spectroscopy*
10. UV-Visble Spectroscopy (optional, including bioassay)
11. Electron Spin Resonance Spectroscopy (ESR)
12. Polarimetry, optical rotatory dispersion and circular dichroism

13. Scanning electron microscopy (SEM)
14. Transient electron microscopy (TEM)
15. Molecular recognition and Sensors
16. Microfabrication and devices, such as the micro total analysis bio assay
17. Labeling methods 2nd book
18. Thin layer chromatography 2nd book
19. Ellipsometry (optional, 3rd book)

20. Surface conductivity measurements (3rd book)
21. Atomic force microscopy (AFM) 3rd book
22. Scanning Tunneling microscopy (STM) 3rd book
23. Surface plasmon (SPR) 3rd book
24. Electrochemistry 3rd book
25. Interferometry (anal chem review)

Criteria to choose other topics:

1. Will be used in your research
2. Having the instruments on campus
3. No overlap with other courses

Book used: (all one bobvista website)

1. Instrumental methods of chemical analysis, edited by H. Kaur, 2010.
2. Chemical analysis : modern instrumentation methods and techniques. By Francis Rouessac, Hoboken, N.J. : Wiley ; Chichester : John Wiley [distributor], 2007. Call # QD79.I5 R6813 2007
3. Surface and Interface Analysis, edited by R. Holze, Spinger, 2007
4. Chemical sensors : an introduction for scientists and engineers / Peter Gründler, Berlin ; New York : Springer, 2007, Call# TP159.C46 G7813 2007
5. Surface plasmon resonance based sensors / volume editor: Jiří Homola ; with contributions by J. Dostalek Call# QC176.8.P55 S87 2006 Berlin ; New York : Springer, 2006
6. Surface analysis : the principal techniques / edited by John C. Vickerman, Chichester [England] ; New York : John Wiley, c1997, Call# TA418.7 .S726 1997 (no e-book)