MSE 722 – Surface Science
University of Virginia – Fall 2000

Syllabus

Goal: Learn the fundamental science of solid surfaces and modern methods of surface analysis, be able to extract information from reported data and decide what analysis technique is useful for different cases. The course will emphasize concepts but will include examples of applications.

Textbooks: The course will be based on these two books. Supplementary notes will be made available:

*Introduction to Surface Chemistry and Catalysis*, G. A. Somorjai; (Wiley, 1994).


Instructor: Raul A. Baragiola
Thornton Hall, B101; Phone: 804-982-2907; e-mail: raul@virginia.edu
Web: www.virginia.edu/ep/faculty/baragiola.html

Grading breakdown: Homework and papers 40%
Tests 60%

Tentative Topics: (Please let the instructor know if you’d like a specific topic to be covered.)


IV. Electron Spectroscopy. Ultraviolet and X-ray photoelectron spectroscopy (XPS/ESCA). EELS. Surface analysis using XPS and Auger spectrometries.


VI. Gases on surfaces. Physi- and chemisorption, desorption.

Raúl Baragiola obtained his Ph.D. in Physics in 1971 from the Balseiro Physics Institute in Argentina. He worked in the Argentine Atomic Energy Commission doing research in collisions in gases and solids, ion implantation, and surface physics. He also started and headed a computer company (Altec) that developed, manufactured, and marketed microcomputer hardware and software products. During 1988-1990 he was a visiting scientist at Rutgers University, in the Laboratory for Surface Modification. In 1990, he came to the University of Virginia where he is a Professor of Engineering Physics and Materials Science, and Director of the Laboratory for Atomic and Surface Physics.

Dr. Baragiola’s research activities include ion-solid interactions, surface physics, laboratory simulations of surface processes in astronomy and astrophysics, applications of ion implantation and focused ion beams to electronics and biology. In addition, he collaborates with outside groups in the U.S. and Europe on electron emission at surfaces, chemical alteration of asteroids by the solar wind, plasmon excitations in solids, and nanoscale fixation of biomolecules by focused ion beams. Dr. Baragiola is a member of NASA’s CAPS team for the Cassini mission to Saturn where he helped develop a novel mass spectrometer for space plasma measurements. His research is funded by grants from NSF and NASA.

Dr. Baragiola gives regularly invited talks in a variety of topics and has been the chief organizer of several international conferences. He was recipient of several national and international prizes in physics, was elected Fellow of the American Physical Society and of the Institute of Physics (England), was Presidential Fellow at the University of Virginia and held the Iberdrola visiting professor chair at the University of Madrid. He has lectured at several other universities, including Paris and Salford. He is a member of the American Physical Society, the Institute of Physics, American Vacuum Society, the American Astronomical Society, and honorary member of the Boemische Physical Society.