Personnel Placement

Replies to blind ads should be addressed as follows:
Box (give number)
SCIENCE
1515 Massachusetts Ave., NW
Washington, D.C. 20005

POSITIONS WANTED

(a) **Organic Chemistry** Ph.D., extensive drug development, compound synthesizing experience; prefers medicinal chemistry supervising appointment. (b) **Epidemiology** M.P.H., bacteriology B.A., ASCP; exceptional Public Health laboratory, teaching, research experience; seeks position with responsibility. Write WOODWARD MEDICAL PERSONNEL BUREAU, 185 North Wabash, Chicago 60601. X

POSITIONS OPEN

SR. BIOCHEMIST—MICROBIOLOGIST: Ph.D. Strong biochemistry background with some training and experience in Microbiology. For program involving the biosynthesis of radioactive labeled compounds. Will also be responsible for the maintenance of a culture collection and large-scale growths of microorganisms to be used for the isolation of enzyme preparation. Ability to supervise laboratory personnel. Send complete résumé to: Mr. A. R. Aronson, Personnel Mgr., **NEW ENGLAND NUCLEAR CORPORATION, 575 Albany Street, Boston 18, Mass.**

IMMUNOLOGY

Pre- and postdoctoral traineeships in immunology (immunochemistry, immunohematology, delayed hypersensitivity, tissue transplantation). M.S. and Ph.D. programs available. For further information write to **Dr. Robert A. Patnode, Department of Microbiology, University of Oklahoma Medical Center, Oklahoma City, Oklahoma.**

(a) **Ph.D. Cytologist**; genetics and histology training; West Coast radiobiology research. (b) **Statistician**; data correlation, original contributions; East Coast. (c) **Hospital Product Development**; medical biology training; engineering helpful; to $10,000, Central. (d) **Ph.D. Organic Chemist**; pharmaceutical organic synthesis experience; to $14,000; East. (e) **Bacteriologist**; experienced; Central health department; to $8800. (f) **Ph.D. Boichemist**; connective tissue research; to $15,000; East. (g) **Electronic Engineer**; vacuum tube, transistor circuitry experience; instrumentation design; Central.
FACULTY APPOINTMENTS: (h) **Ph.D. Biochemist**; carbohydrate, enzymes training; eastern medical school. (i) **Ph.D. Biophysicist**; human/animal orientation; Central university. (j) **Zoologist**, M.S./Ph.D.; invertebrate, general zoology; second semester sabbatical substitution; southeastern university.
Many other opportunities available for Junior and Senior Scientists. Please write Science Department, **The Medical Bureau**, 900 North Michigan Avenue, Chicago, Illinois 60611. X

POSITIONS OPEN

BIOCHEMIST

Large insurance company in metropolitan New York area is seeking a clinical biochemist with Ph.D. (or Master's with some work toward Ph.D.) and 1 to 5 years' experience for a supervisory position in a clinical laboratory. Administrative and training duties with some applied research. Salary will be commensurate with qualifications. Liberal employee benefits program.

SEND RESUME TO:
BOX 499, SCIENCE

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IMMUNOLOGIST—TUCSON, ARIZONA
to participate in well-established program on selective plasmapheresis and other applications of extracorporeal blood circulation. Permanent position. Supported by Veterans Administration but with possible University affiliation. Please apply with full résumé to **Box 500, Science.**

Microbial Genetics: Assistant professorship, teaching and research; West Coast medical school.

Box 498, SCIENCE

MICROBIOLOGIST—Ph.D.

An opening has recently developed in our Infectious Disease Department for which we are seeking a Bacteriologist with biochemical training. Duties will involve the investigation of various infectious disease processes in animals and their biochemical manifestations. Following the establishment of sound basic information, the program will be expanded to include the study of the effects of new pharmacological agents on these processes.

Please send curriculum vitae as well as salary requirements to: Cyrus M. Greenberg, Ph.D. Director of Scientific Employment, SMITH KLINE & FRENCH LABORATORIES, 1558 Spring Garden Street, Philadelphia, Pa. 19101. An Equal Opportunity Employer

SK&F

Ph.D. BIOCHEMIST

For bone research. General background in analytical and physical chemical methodology. Salary commensurate with experience. Send résumé to:

M. R. Urist, M.D.
UCLA Dept. of Surgery
1019 Gayley Avenue
Los Angeles, California 90024

ENTOMOLOGIST

We invite you to measure your individual growth and career interests against this dynamic company in the pharmaceutical and chemical fields.

A B.S. or M.S. degree in Entomology is required (Chemical or Biochemical minor desired) and up to 5 years' experience developing and conducting testing procedures to determine the effects of experimental insecticides.

Real and numerous opportunities exist to utilize your independent initiative and creative imagination while pursuing original research.

● Salary is commensurate with ability and experience ● Attendance at professional meetings and publication of technical papers is encouraged ● Comprehensive company paid benefit program includes advanced tuition reimbursement ● Pleasant suburban New Jersey location

Direct your resume including current salary to:

Box S771, 125 West 41 St., NYC 36

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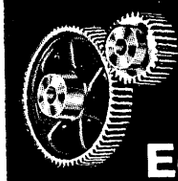

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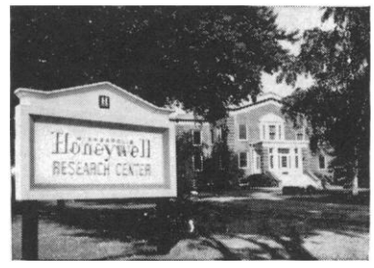

Beam Surface Interactions in Ultra High Vacuum Systems

In high vacuums the quantity of gases adsorbed on the surfaces in the vacuum is much greater than that contained in the volume. New studies of the interactions of beams with surfaces are making possible further understanding of the reactions that occur at the interface of a solid and a gas in a high vacuum environment.

Within an ultra high vacuum system, the reactions that take place at the surface may have an appreciable effect on the surrounding vacuum and on the properties of the solid itself. Continued progress in the fields of semiconductors, thin films, the vacuum phenomena related to space exploration and others have pressed the state of the art of vacuum physics. This field has long been of interest but many tools were lacking. The explosion in vacuum technology since the early 1950's, however, has resulted in considerable basic progress.

Recently lower pressures have been achieved and gauges and other instrumentation improved. We are now able to probe some fundamental questions:

1. What is the surface of a substrate like? What are the surface atom layers like? Is there an oxidized layer?
2. What is sitting down or adsorbed on the surface? With what energy is it bound to the surface?
3. Beams of photons, electrons, ions or atoms may strike the surface. When they do, what happens? What are the interactions?

If we could answer all these questions we could develop a model with specific constants.

Honeywell scientists have chosen a research technique whereby particle beams are used to probe a surface in an ultra high vacuum environment. Components leaving the surface (that is, neutral atoms, neutral molecules and positive or negative ions) are analyzed with a mass spectrometer.

A series of studies is being made to see what effect varying parameters have on the components leaving the surface. The kind of beam used, the kind of substrate and the temperature of the substrate as well as the content of the vacuum environment are varied.

Honeywell scientists use an evacuated system pumped by cryogenic and ion means resulting in a background pressure of about 10^{-10} Torr.

A target with surface temperatures controlled by heaters is mounted in an interaction chamber and bombarded. All particles leaving the target pass through a mass spectrometer analyzer. Probing is done with very low density beams since the detection system permits recording of single ions or partial pressures as low as 10^{-16} Torr.

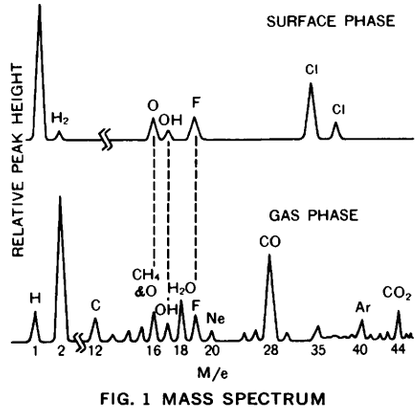

FIG. 1 MASS SPECTRUM

Lower Plot—gas phase components in the system at a total pressure of about 1x10-9 Torr.

Upper Plot—spectrum of surface phase obtained by bombarding single crystal nickel with electrons and analyzing the desorbed ion components.

These experiments have produced several unexpected observations:

1. Electron bombardment will desorb neutral molecules, suggesting an interaction between the electron and the adsorbed molecule.
2. Ions are desorbed at the same time and appear to be fragments of the parent adsorbed molecule, suggesting ion fragment desorption.
3. No parent molecule ion desorption was observed.

These studies indicate the existence of a whole spectrum of electron-induced ion desorbed species, permitting the analysis of surface phase components in a manner similar to that used for gas phase components. The technique also permits continuous observation of surface components as parameters are varied.

Bombardment with U.V. photons has also desorbed neutral molecules. This suggests that photon interaction might be used to clean surfaces in a vacuum without any heating effects.

Work is continuing at Honeywell's Research Center and as more parameters are introduced even more understanding seems possible. As an example, a ruby laser was used to bombard the target causing thermal desorption and permanent degassing of an extremely small area of the target. This technique will permit further exploration and comparisons of the degassed spot and surrounding surfaces.

Although a long way from a final theory, the new techniques already have provided information of value in programs as diverse as electrical contacts, U.V. detectors and space instrumentation.

If you are engaged in vacuum surface physics and wish to know more about Honeywell's work in this area you are invited to write Mr. David Lichtman, Honeywell Research Center, Hopkins, Minnesota. If you are interested in a career at Honeywell's Research Center and hold an advanced degree, write Dr. John Dempsey, Director of Research at this same address.

Honeywell

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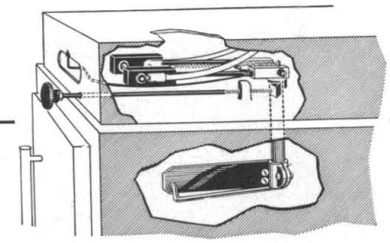

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