VI. INTERFACIAL CHEMISTRY

Academic Research Staff

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1. WORK FUNCTION OF CHEMICALLY MODIFIED SURFACES

Joint Services Electronics Program (Contract DAAB07-76-C-1400)

Ralph H. Staley

We have initiated this project to investigate the effects of oriented monolayers of molecules containing strong internal dipole moments on the work functions of semiconductor and metal surfaces. The project is designed to identify the factors that should be incorporated in a model for molecular effects on work function and to learn how to produce chemically stable surfaces with very high and very low work functions.

We have constructed an apparatus which can be used to prepare samples and measure their photoelectric work function under ultrahigh vacuum conditions. Design, construction, and initial testing have been completed. We have also been investigating preparation of surfaces using both clean vacuum techniques and wet chemistry. Methods for covalently attaching various organic functionalities to surfaces with chlorosilane reagents have been tested. The project is now beginning to study work functions of silicon and platinum surfaces with various molecular functionalities attached.

2. PHOTOACOUSTIC SPECTROSCOPY OF SURFACES

Joint Services Electronics Program (Contract DAAB07-76-C-1400)
National Science Foundation (Grant DMR-76-80895)

Ralph H. Staley

We are initiating this project to develop photoacoustic spectroscopy as a method to identify and characterize molecular species on or near surfaces. This technique has only recently been developed and its potential for use in studying surfaces demonstrated. We are in the process of acquiring a photoacoustic spectrometer system. Work has also begun on design of sample cells for use with liquid-solid interface samples and other nonstandard sample arrangements and on design of modifications and accessories needed to exploit the potential of this technique in the infrared. An initial application of this new spectroscopic tool will be to monitor extent of coverage and chemical state of molecular species at the surface in our project on work functions of chemically modified surfaces.