1995 PROGRAM

9:00 a.m. **Registration and Coffee - Room 137, Chemistry-Physics Building**

9:30 a.m. **Welcome by Dr. David Watt, Vice Chancellor for Research and Graduate Studies, University of Kentucky - Room 139, Chemistry-Physics Building**

9:35 a.m. **Introductory Remarks - Leonidas Bachas, University of Kentucky**

9:40 a.m. **Dennis Chapman, University of London, Royal Free Hospital School of Medicine**
Haemocompatibility, Protein Adsorption & New Biomaterials

This talk will show the development of new biomaterials which are haemocompatible and protein resistant. They are based upon a simple mimicking of the outer lipid surface of serum lipoproteins and the outer lipid matrix of erythrocyte and platelet cells, using the dominant phosphoryl choline group present in the systems, to produce new polymeric biomaterials. Examples of the application of these new biomaterials to blood oxygenators and angioplasty devices including stents will be shown including results of the various *in vitro* and *in vivo* tests which have been made. These new biomaterials can be used in the form of surface coatings or as bulk polymers. The fact that their surfaces are protein resistant has been used to develop new hydrogel polymers for the construction of contact lenses. These contact lenses are protein and lipid resistant and do not readily dry out and have excellent oxygen permeability. The contact lenses are already on the UK market and preparation is in hand for their launch into the Canadian and U.S. markets. Future non-health care applications such as bioseparation membranes and marine anti-fouling applications are being explored and will be described.

10:25 a.m. **Discussion**

10:35 a.m. **Dr. Janos H. Fendler, Syracuse University**
Membrane-Mimetic Approach to Advanced Materials Synthesis

A membrane-mimetic approach to advanced materials synthesis has been developed in our laboratories. Three different methodologies will be discussed. In the first one, semiconducting, magnetic, and metallic nanoparticles are being generated *in situ* under monolayers floating on aqueous solutions. In the second method, nanoparticles are being generated *in situ* between the polar headgroups of Langmuir-Blodgett films. In the third method, uniform, size-quantized particles, dissolved in organic solvents, are being spread on the surface of aqueous solutions in a Langmuir film balance. Characterization and potential utilization of the nanoparticles generated by the three different methodologies will be discussed.

11:20 a.m. **Discussion**

11:30 a.m. **Dr. Buddy D. Ratner, University of Washington**
Blood Compatibility: The Difficult Issues

Thrombosis and thromboembolism continue to complicate the effectiveness of medical devices used in contact with the blood stream. Many of the materials used today in medical practice are the same as were used 30 years ago, and the problems with them have not appreciably diminished. This talk will address the reasons for the slow progress, and offer some insights about the performance of materials in blood. The reason for slow progress is attributed to the lack of a clear definition of the frequently used term "blood compatibility." For example, there are different coagulation mechanisms that are operative in arterial and venous flows, and different materials may be more suited for the arterial or the venous environment. Also, evaluation tests that measure adhesive blood elements, embolic production or systemic reactivity of blood elements will each view into different aspects of the thrombogenicity of materials. Some blood compatibility evaluation schemes that provide quantitative information on the reactivity of materials with blood will be described. Based upon these tests, a few conclusions about materials can be drawn. Hydrophobic surfaces have low reactivities with blood platelets. Hydrogel materials and polar surfaces appear to be highly platelet consumptive. For studying platelet reaction with materials, four possibilities should be considered. First, platelet adhesion may occur and the platelets may continuously react, aggregate and embolize. Second, platelets may not stick to the surface, but may continuously react with it. Third, platelets may stick to the surface, spread and passivate the surface thereby reducing its reactivity. Finally surfaces that neither adhere platelets or react with them should be considered. Examples of materials in all four categories will be presented. Materials in categories 3 and 4 may be designated "blood compatible" or, more properly, "platelet compatible."

12:15 p.m. **Discussion**

12:30 p.m. **Buffet Lunch, Faculty Club (Please return registration form by April 3, 1995 for reservations. Cost $10.00 to be paid at registration.)**

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Twenty-First Annual
Symposium on

Chemistry & Molecular Biology

established in the memory of
Anna S. Naff

Biofunctional Membranes and Biomaterials

SPEAKERS
Dennis Chapman
Janos H. Fendler
Buddy D. Ratner

Wednesday, April 12, 1995

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