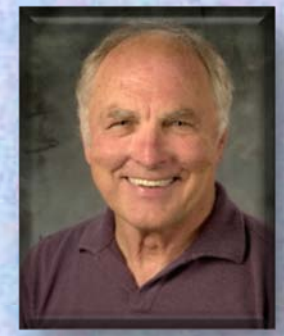
The 120th MANA Special Seminar



Systems and Interfaces for Controlling Bioprocesses: An Example

Chair: Dr. Masakazu Aono (MANA Director-General)

Prof. Galen D. Stucky

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The dynamic and often subtle interactions among organic and inorganic species and/or organized arrays covers a wide kinetic and thermodynamic phase space that offers almost unlimited opportunities to synthesize hierarchical multifunctional systems; and, to subsequently selectively use the interface chemistry to modify bioprocesses. This talk will focus on some recent research on the use of inorganic species to control bioprocesses, specifically the development of a protocol to accelerate or inhibit blood coagulation by using inorganic-blood interface chemistries that selectively control local protein and blood-cell chemistry, electrolyte accessibility, local dehydration driven concentration profiles, and changes in local blood temperature. A more-detailed working understanding of the chemistry interface between the inorganic surface and the blood protein factors that are part of the blood-clotting cascade can be arrived at by adding to or depleting the blood-factor component concentrations that are associated with the blood-clotting system chemistry, including the presence or absence of external agents such as anticoagulants. The inorganic interface and pore structure can be selectively defined to be protein-size accessible so that in a high-surface-area form, the materials can be used as an active enzyme support or other large-molecule delivery agent to the blood system. Smaller pore configurations can be used for electrolyte and antibacterial agent delivery. The inorganic surface acid/base properties, hydrophobicity, charge and isoelectric point are potentially important variables that can be readily modified. Understanding the relative roles of blood and inorganic composition on thrombosis and anticoagulation are interesting challenges in a system that is autocatalytic and self-regulating, and capable of both hemostatic and bone-forming activity. The correlation and use of in vitro research and in vivo testing for potential commercial applications will be summarized.

Venue: **4F, Large Seminar Room, Collaborative Research Bldg.**

Date: **Jan 13th Wednesday** ***Time:*** **15:00-16:00**

NAMIKI Site

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