DEPARTMENT OF CIVIL ENGINEERING AND GEOLOGICAL SCIENCES

Spring 2011 Seminar Series

CHALLENGES AND INNOVATION IN CIVIL AND ENVIRONMENTAL ENGINEERING

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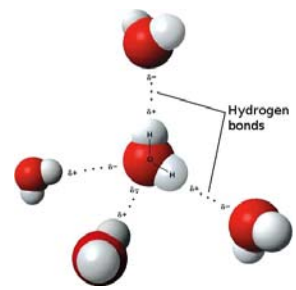
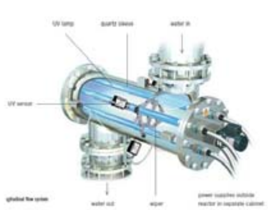


The Quest for Pure Water…From Atoms to Oceans

Thursday, April 14, 2011, 3:30pm, 129 DeBartolo

Life on Earth is inextricably linked to the dynamics of the hydrologic cycle and the often violent geohydrology of the planet. Water comprises up to 78% of the human body by weight and humans can only survive for a few days without potable water. Thus, individuals and nation states alike have sought to secure clean reliable sources of water to survive and flourish and more than 225 regional wars or conflicts have been fought over access to pure water. From the first atomic description of the water molecule to the engineering of megalithic-systems for the treatment and delivery of water to vast population centers, the new water wars are being increasingly fought in the technological arena at great risk and expense. No longer it seems is everyone entitled to pure water. Instead water is distributed as a tangible commodity to those who can best afford the cost of extraction, purification and transport. Perhaps the most successful technological innovations for water purification involve permselective synthetic membrane barriers, which efficiently separate water from chemical and microbiological contaminants and other solutes. In recent years, large membrane facilities for ocean desalination, water reuse, and power generation have been erected around the world, which now represent an essential cornerstone of our ability to survive and prosper as a species. Yet, the atomic-scale basis for and control of membrane separations remains only partially understood and continues to be the subject of intensive research and development both in the academic and industrial sectors, the outcome of which will shape our water future and the geopolitical landscape. Serious impediments remain to the advancement of membrane separations and their large-scale application across the globe. Among these challenges are the need for discovery of more efficient membrane chemistries and processes, as well as the elucidation of fundamental interactions between the membrane material surfaces and waterborne microorganisms.



Harry Ridgway holds a B.S. degree in Microbiology/Chemistry from San Diego State University and a doctorate from the University of California, Scripps Institute of Oceanography. From 1976 to 1981, Dr. Ridgway conducted postdoctoral studies on the molecular genetics of E. coli and biofilms in water systems at the San Diego and Irvine campuses of the University of California. In 1981 Dr. Ridgway joined Orange County Water District in Southern California, and from 1985 to 2002 served as Research Director where he pioneered studies on the mechanism and dynamics of bacterial adhesion and biofilm formation on reverse osmosis membranes. He worked with numerous membrane companies and helped shape the current generation of commercial low-fouling, high-flux, thin-film composite membranes. Dr. Ridgway has developed molecular simulations tools for elucidation of theoretical mechanisms of membrane transport and surface fouling and for modeling the transformation of organics in advanced oxidation processes. In 2002, Dr. Ridgway was awarded the Athalie Richardson Irvine Clarke Prize for his innovative contributions in the area of membrane biofouling. In 2003, Dr. Ridgway formed AquaMem Scientific Consultants, a private consulting and research enterprise. Dr. Ridgway currently serves as Consulting Professor, Department of Civil and Environmental Engineering, Stanford University.