Nova Scotia Energy Research and Development Forum 2012

Edwin DeMont

Biography

Edwin DeMont is a Full Professor in the Biology Department at St. Francis Xavier. He received his doctorate in aquatic animal locomotion and has been on faculty at StFX since 1988. He is a member of the university's recently established Centre for Biofouling Research. New to the St.FX curriculum this year, Dr. DeMont created and taught a new biology course for first year engineers and used tidal power as a case study for discussions on the built environment. He was a founding member and first President of the Offshore Energy and Environmental Research Association (OEER) and is presently a member of OEER's Research Advisory Committee (RAC). His research interests are focused on the biomechanics of locomotion in marine animals.

Presentation Abstract: Biofouling Research at St. Francis Xavier University

Bio-fouling refers to the unwanted accumulation of organic material and microorganisms such as bacteria and diatoms as well as algae, mussels and barnacles, on moist surfaces. Vessels and equipment deployed in marine environments such as ships, oil and gas pipes, oceanographic sensors are seriously impacted and, if left unattended, fail to perform as designed, and incur huge economic demands. Traditional ways to keep surfaces free of biofouling or marine growth has been to hire divers to scrape the growth off or coat the submerged surfaces with toxic paint. Neither method is effective over the longer term or environmentally friendly.

The Centre for Bio-fouling Research at St. Francis Xavier University is an interdisciplinary team of biologists, chemists and physicists created to address these problems. One approach to biofouling is to create bio-inspired solutions. Marine organisms such as mussels, scallops and sharks have micro-patterned surfaces shown to inhibit settlement of specific biofoulers, most likely due to a reduced number of attachment points to the surface. Our group has been investigating baleen surfaces from fin whale (*Balaenoptera physalus*) and gray whale (*Eschrichtius robustus)* as possible antifouling surfaces. Baleen functions to filter krill, plankton and small fish from sea water. As such, it is likely to have antifouling or anti-adhesive properties to ensure a consistent flow without clogging. We tested baleen pieces for biofouling properties and examined their surface topography with an atomic force microscope. We have prepared surfaces with similar micrometer sized surface wrinkles, consisting of antimicrobial polymers which will be evaluated using *Pseudomonas aeruginosa*, FRD1 bacteria grown in seawater media. We are presently designing a flow cell to test prototypes in a variety of flow conditions. The research team will continue its efforts in developing and testing a variety of innovative non-polluting coating solutions as a means to find non-toxic ways to maintain clean underwater surfaces for applications in the offshore.