Michael Goldfeld, J Pet Environ Biotechnol 2012, 3:7
http://dx.doi.org/10.4172/2157-7463.S1.001

OMICS Group Conferences
Accelerating Scientific Discovery

Global Biofuels & Bioproducts Summit

November 19-21, 2012 Hilton San Antonio Airport, USA

Michael Goldfeld

Advanced BioCatalytics Corporation, USA

Combining the best of the two worlds, natural and synthetic, for synergy in sustainable environmental technologies

In the development of new products for industrial cleaning and related environmentally sensitive technologies, several aspects interplay, such as:

- Efficiency
- Safety for the staff and the public
- Environmental impact
- Availability of resources
- Economics

These aspects are not mutually independent, e.g. higher efficiency is associated with a lower dose rate, and thus, with a lesser environmental impact. High efficiency is often achieved with harsh, aggressive synthetic chemicals, while certain milder and naturally derived ingredients do not provide enough efficiency per se, and may be in short supply, or economically unviable.

The primary topic of this outline is the phenomenon of a synergistic enhancement of the efficiency of synthetic, mostly petroleum oil-derived, surfactants by their association with low molecular weight exo-proteins released by yeast in the course of a modified fermentation conditions.

Although protein-surfactant interaction was an area of extensive studies for over half a century, their focus was mostly on the effect of surfactant on protein structure and function, such as unfolding of a native protein conformation by surfactants, inhibition of enzymatic activity and alike. We at ABC, concentrate on the other side of this interaction, i.e. on the effect of proteins on the properties of surfactants. Over the years, mainly with application of the standard techniques of surface science, such as pendant drop and contact angle measurements, it was shown that many synthetic surfactants: anionic, cationic, non-ionic and amphoteric, form rather stable complexes with yeast exo-proteins, that significantly outperform the same surfactants taken alone, in terms of the reduction in surface tension, oil/water interfacial tension, critical micelle concentration, enhanced wetting and spreading on various surfaces, including, e.g. petroleum oil-contaminated solid materials, green leaves, human skin, etc.

Taking advantage of this protein-surfactant synergistic enhancement, ABC developed a broad series of products for industrial and environmental cleaning, enhanced oil recovery, agricultural and many other applications. These products combine high efficiency with an excellent toxicological profile, are biodegradable, do not show any adverse effect on the environment, and in certain situations assist in reducing the environmental impact of other materials. Besides enhanced surface activity, protein-surfactant complexes display a more subtle biochemical effect on microorganisms, which is beneficial in waste water treatment and water/soil bioremediation processes, this latter topic being considered in more detail in the accompanying lecture at this meeting.

Biography

Goldfeld is Director of Corporate Research at ABC. He received his MSc degree from the Moscow University, and PhD and DSc in biophysical chemistry from the Russian Institute of Chemical Physics where he served as a professor and head of research. He later held teaching and research positions in US institutions, including NASA-Caltech's Jet Propulsion Laboratory and University of California – Irvine. His expertise is in surface science and physical methods in biochemistry/biophysics. He authors over 120 research papers, a monograph, textbooks and patents, served as editor and reviewer for several magazines (currently at the Journal of Petroleum and Environmental Biotechnology), paper collections and books.

MGoldfeld@abiocat.com