Michael Goldfeld, J Pet Environ Biotechnol 2012, 3:7
http://dx.doi.org/10.4172/2157-7463.S1.005

OMICS Group Conferences
Accelerating Scientific Discovery

Global Biofuels & Bioproducts Summit
November 19-21, 2012 Hilton San Antonio Airport, USA

Yeast proteins as surfactant synergists in environmental applications

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Yeast respond to environmental stress, such as non-lethal heat shock, by releasing certain non-enzymatic proteins (stress proteins). The latter were shown to form tightly bonded non-covalent complexes with a variety of surfactants: anionic, non-ionic and cationic. Although these yeast exo-proteins do not display surface activity per se, they significantly enhance the efficiency of surfactants involved in the protein-surfactant complexes (PSC), as revealed by reduced surface and oil/water interfacial tension (IFT), and critical micelle concentration (CMC), improved spreading and wetting of different solid surfaces, enhancing cleaning power and dispersing efficiency of surfactants. Based on this model of surfactant-protein synergistic enhancement, a suite of products has been developed, with application in cleaning ocean fleet chemical cargo tanks, other tanks and containers, ships, food processing equipment, processing equipment, preventing and removing biofilms from reverse osmosis membranes, enhancing efficiency of certain sanitizing agents, herding petroleum oil spills from the water surface, and dispersing oil plumes in petroleum oil contaminated water. PSC work as adjuvants to bioactive compounds, such as herbicides, due to a better spreading, wetting and leaf uptake, and activate certain enzymes acting at the oil/water interface. PSC also accelerate biodegradation of organic contaminants by indigenous microflora, and thus improve waste water processing and bio-remediation of contaminated soil and water. This effect is due to uncoupling of the bio-oxidation process from energy-consuming biosynthetic processes and biomass accumulation. ABC products are certified by the International Maritime Organization, National Sanitary Foundation, included into the US EPA National Contingency Plan listings, and received Green Seal certification.

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.

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