OMICS Group Conferences
Accelerating Scientific Discovery

Global Biofuels & Bioproducts Summit

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

Large scale algal cell rupturing using Square Wave Electric Fields (SWEF) to release algal natural products

Rhykka Connelly, Robert Pearsall, Bruce Morrison, Morela Montoya, Michael Werst and Robert Hebner
University of Texas, USA

Algae are a promising biomass feedstock for the production of renewable energy and nutraceutical products. However, cost effective algal cell compromise and product liberation remains an industry challenge. Pulsed electric fields (PEF) in excess of 10 – 30 kV/cm have been demonstrated to rupture algal cells; we have developed and tested a solid state system that exposes wet algae flowing at 2 gpm to a pulsed electric field (PEF) applied as a 9kV/cm, short duration square wave electric field (SWEF). Algae tested include *Chlorella vulgaris, Scenedesmus dimorphus, Nannochloropsis salina, Schizochytrium sp.* and *Phaeodactylum tricornutum.* 72% - 95% of triacylglycerols from all species tested were released as submicron-sized droplets following exposure to the EF as visualized by histochemical staining and quantified by HPLC/MS. EF-stimulated lipid release was not dependent on salinity or density of the culture, although operating costs do correlate with salinity. Cellular compromise and lipid release was strongly correlated with viability of cells, suggesting that the SWEF exploits the dielectric properties of the cells. We conclude that flow through algal cellular compromise and lipid release can be achieved using a lower voltage short duration square wave electric field.

Biography

Rhykka Connelly completed her PhD at Northern Illinois University in Cell Biology and postdoctoral studies at The University of Texas. She is the Technical Director of the University of Texas Algae Science and Technology Facility located in the heart of Austin, TX. She has published more than 15 papers in reputed journals and is an inventor on more than 12 patents, including “Organic fertilizer derived from processed algal biomass”.

r.connelly@cem.utexas.edu