A Hasnain et al., J Bioproces Biotechniq 2016, 6:7(Suppl)
http://dx.doi.org/10.4172/2155-9821.C1.010

4th International Conference on

Bioprocess and Bio Therapeutics

October 20-21, 2016 Houston, USA

Fluid mixing, dynamics and scale-up of biofuel molecules

A Hasnain, N Singh, G Sivakumar and **K Alba**
University of Houston, USA

An oil-rich microalgae, *Stichococcus bacillaris* strain siva2011, biosynthesizes hydrocarbons and lipids which can be used as biofuel. The mechanism involves injecting air through a liquid medium surrounding the algae. It has been found that the amount of algae produced strongly depends on the flow parameters affecting mixing such as tank dimensions, air injection rate, sparger holes diameter, the volume, density, and viscosity of the containing liquid. The significant scale-up of the process is currently not possible due to the lack of fundamental knowledge on the underlying mechanisms governing the multiphase flow in question. In order to address this, we have conducted fluid flow experimentation using novel non-intrusive visualization and velocimetry techniques. Our experimental methodology consists of laser imaging and particle tracking, providing detailed information on mixing pattern and vertical structures forming within the flow. The structure of the vortices forming within the flow has been studied, revealing more efficient mixing throughout the vessel at higher injection rates. Analysis of the results in dimensionless maps paves the way to successful scale-up of the process at hand for commercialization and increased production. Similar examples of energy-related processes in the petroleum industry are will be discussed, emphasizing the important role of fluid dynamics in design methodologies.

Biography

Dr. Kamran Alba received his PhD in 2013 from Mechanical Engineering Department of The University of British Columbia. His main research area lies in the field of experimental and analytical fluid dynamics with applications vastly found in energy, food-processing, mining and biology fields. The fluid flows studied range from multiphase, suspension and buoyant systems to coating and co-extrusion processes. He is currently an Assistant Professor in Department of Engineering Technology of The University of Houston and the manager of Complex Fluids Laboratory

kalba@Central.UH.EDU

Notes: