

Small Scale Bio-production: Beyond the Flask.

The BioPark Hertfordshire, Welwyn Garden City, AL7 3AX: 18th November 2011

"Once you can produce it in a flask, what next? The focus of this meeting will be on techniques for the bioproduction of usable quantities of biologic materials, specifically recombinant proteins, monoclonal antibodies, cytokines viruses and other secreted cellular products from eukaryotic cells. Topics covered will include expression systems, mammalian vs. insect vs. other, constitutive vs. transient expression, cell culture medium considerations and culture devices for scale-up that can be used in any laboratory. This meeting should show the fastest pathway from discovery to proof of principle and the production of 100 mgs to several grams of product"

Meeting Chair: Dr John J.S. Cadwell, President and CEO, FiberCell Systems Inc, USA

This meeting has CPD accreditation

- 9:00 – 9:45 **Registration**
- 9:45 – 10:00 **Introduction by the Chairs:** Dr John J.S. Cadwell, President and CEO, FiberCell Systems Inc, USA
- 10:00– 10:30 **Production in hollow fiber**
Vincent Dewar GSK
- 10:30 – 11:00 **Talk title to be confirmed**
Professor Robert Edwards, Durham University, UK
- 11:00- 11:10 **Speakers photo**
11:10 – 11:30 **Mid-morning break**
- 11:30 – 12:00 **Talk title to be confirmed**
- 12:00 – 12:30 **Moving from the flask to proof of principle - what regulatory questions do I have to answer?**
Dr Colin Love, BioVex UK
- 12:30–13:30 **Lunch and Poster Viewing**
- 13:30 – 14:00 **PAT and Quality by Design – a Process SystemsEngineering View**
Professor Julian Morris, Technical Director CPACT and Professor of Process Control, Centre for Process Analytics and Control Technology, Newcastle University, UK.
Unlike in off-line assays, in-situ or on-line real-time spectroscopic measurements are almost inevitably subjected to fluctuations/variations of process variables such as temperature as well as sample compactness, instrumental effects and other external process variables and physical properties of samples. This makes the task of extracting the relevant chemical information, and ultimately reliable process understanding for process modelling and for closed loop process control and optimization, from spectroscopic measurements well beyond being routine in pharmaceutical manufacturing. Challenges also relate to the routine integration (fusion) of analytical and process sensor based chemical and biological measurements which may be dynamic, nonlinear and of disparate forms. All these exacerbate the building robust, transferable, calibrations (models). The presentation will discuss the application of recently developed multivariate methods to enable the assured application and on-line real-time use of process analytics for process monitoring and control.
- 14:00 – 14:30 **Coproduction of biopolymers consisting of Medium chain length 3-hydroxyalkanoic Acid and Exopolysaccharide by *Pseudomonas* CMG607w of marine origin**
Nazia Jamil Department of Microbiology and Molecular Genetics, University of the Punjab, Lahore-54590, Pakistan
- 14:30 – 15:00 Selected oral abstracts
- 15:00 – 15:30 **Afternoon Tea/Coffee and Last Poster Viewing**
- 15:30 – 16:00 **Gram Quantity Production of Monoclonal Antibodies and Recombinant Proteins in a Hollow Fiber Bioreactor System**
Dr John J.S. Cadwell, President and CEO, FiberCell Systems Inc, USA

16:00 – 16:30 Talk title to be confirmed

17:00 Chairman's summing up.

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About the speakers

Julian Morris is Professor of Process Control at Newcastle University and Visiting Professor in the Department of Pure and Applied Chemistry at the University of Strathclyde and Director of the Centre for Process Analytics and Control Technology (CPACT). He is the immediate past Head of the School of Chemical Engineering and Advanced Materials at Newcastle University, head of the Department of Chemical and Process Engineering between 1990 and 1995, and has spent some time as Professor of Chemical Engineering at the University of Alberta in Canada. He holds positions of Associate Director of the data mining company AJM Consulting; is a member of the UK Centre for Process Innovation (CPI) Advisory Committee. His research interests include process diagnostics and condition monitoring, process performance monitoring, Process Analytical Technologies, neural networks, and advanced process control and optimisation. He has authored/co-authored over 190 articles in scientific journals, conferences and books, given over 70 invited lectures, and 50 Plenary and Keynote presentations. He is a Fellow of the Britain's Royal Academy of Engineering

Full Abstracts

"Coproducts of biopolymers consisting of Medium chain length 3-hydroxyalkanoic Acid and Exopolysaccharide by *Pseudomonas* CMG607w of marine origin"

Nazia Jamila, Nuzhat Ahmedb, David H. Edwards^c, Hilary K. Young^c and Geof M. Gadd^{ca}

Department of Microbiology and Molecular Genetics, University of the Punjab, Lahore-54590, Pakistan, ^bCentre for Molecular Genetics, University of Karachi, Karachi-75270, Pakistan, ^cDepartment of Molecular and Cellular Medicine, University of Dundee, Dundee DD1 9SY, Scotland, UK.

Background

Bioplastics or polyhydroxyalkanoates (PHAs) are a special type of biomaterial. They are polyesters, produced by a range of microorganisms, cultured under different nutrient and environmental conditions. When the carbon substrate is in excess to other growth limiting nutrients like nitrogen, sulfur, phosphorus or oxygen (Madison and Huisman, 1999; Kim and Lenz, 2001; Reddy *et al.*, 2003), many microorganisms can accumulate PHAs as intracellular energy yielding and carbon storage granules. These polymers are accumulated in the form of mobile, amorphous, liquid granules of lipids that provide these microorganisms nutrients under stress conditions (Barnard and Sander, 1989; Sudesh *et al.*, 2000).

Objectives

Characterization of *Pseudomonas* CMG607w for the production Exopolysaccharides and mcl-PHA.

Methods

1. Extraction and Purification of biopolymers from *Pseudomonas* CMG607w.
2. PCR based strategy to identify *PhaC* synthase operon.

Results

Bioplastic (medium chain length polyhydroxyalkanoate) was extracted and purified from CMG607w bacterial strain isolated from sediment of Layari River out fall to Arabian sea. PHA synthesis was substrate depended in CMG607w. In presence of sodium gluconate mcl-Pha was synthesized at the rate of 42% cell dry mass. Under highly enrich conditions, co production of polysaccharide and blends of PHB/PHA were observed. PCR base strategy was used to amplify *Pha* biosynthesis operon from chromosomal DNA. In CMG607w *Pha* biosynthesis operon has *PhaC1ZC2D* (polymerase1, depolymerase, polymerase2 and hypothetical protein) genes

orientation. Conserved sequences were observed in *polymerase C1* and *C2*. All gene of Pha operon was cloned and sequenced. Pha biosynthesis operon of CMG607w has 98% homology to *Pseudomonas aeruginosa* PAO1 (AE004919). GenBank accession numbers for polyhydroxyalkanoates synthase operon nucleotide sequences are from AY596787 to AY596795.

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