

Animal Cell Culture and Pilot Plant Fermentation



Researcher :

Phenjun Mekvichitsaeng phenjun@pdti.kmutt.ac.th

- Cell culture technology
- Microbial technology

Kanokwan Poomputsa kanokwan.poo@kmutt.ac.th

- Molecular biology of baculovirus- insect cell
- Protein biochemistry
- Immunology

Saengchai Akeprathumchai

saengchai.ake@kmutt.ac.th

- Chemical engineering
- Membrane filtration
- Animal cell culture

Wairuj Dechmahitkul wairuj.dec@kmutt.ac.th

- Food & bioprocess engineering
- Fermentation and pilot plant processing
- Food & feed technology

Achievements :

Pilot scale cell culture

To culture an insect cell in a bio-reactor is quite difficult due to shear stress problem and high price of media.

We have successfully cultured an insect cell in a 50 L conventional bioreactor with some design adaptations.

We have also study on extraction of sericin to be used as a media supplement replacing essential serum that has a high price

This research group is involved in animal cell culture and microbial process development. The focus is on baculovirus-insect cell system for production of both wild type and genetically engineered baculovirus, which can be directly used as biopesticides and for production of recombinant protein as vaccine or therapeutic proteins for medical applications. Process developments especially submerged fermentation for production of microbial cell mass and/or microbial bio-products such as immune stimulants and other bioactive compounds are also our interest.

Scaling up of both upstream and downstream processes leading to the commercial viable products is our goal. Current areas of interest are in agriculture and feed industry and are moving towards food and pharmaceuticals.

Research Area :

Process Development for several cell types and organisms.

- Baculovirus -Insect Cell System : Insect cells used are such as *Spodoptera flugiperda* (SF9), *Spodoptera exigua* (Se), *Heliotis zea* (Hz) roorganism used,
- Mammalian cells : Hybridoma cell (such as CHO cell, MDCK) ,
- Bacterial cells (such as *Bacillus subtilis* , Lactic acid bacteria)
- Yeast cells (such as *Sacchaomyces cerievisia* , *Phaffia rodozyma*).

Production of proteins and recombinant proteins for medical applications

- Pharmaceutical protein e.g. Dengue viral protein, influenza viral proteins.
- Monoclonal antibody e.g. anti – cortisol mAb
- Vaccines e.g. Influenza vaccine, Blackleg vaccine for cattle

Production of Bioactive Ingredients for Agricultural and Feed Industries

- Environmental friendly bio-pesticides e.g. wild type SeMNPV baculovirus
- Live microorganism as probiotics in feed eg. *S.cerevisiae*, *B.subtilis*
- High value substances from microbes eg. Bacteriocin, Asthaxanthin, Nucleotides

Pilot scale fermentation

- Insect cell culture in a 50 L conventional bioreactor with some design adaptations for baculovirus production
- High density yeast (*S. cerevisiae*) and bacteria production (*B. subtilis*) in 1500 L fermentation systems.

IgY production technology

Anti-coccidia IgY production for prevention of coccidiosis in chicken

IgY Technology

IgY is a specific antibody that produced in a egg yolk when chicken was injected with specific antigen. We have successfully develop a process of produced an egg-yolk power that can be used efficiently against coccidiosis in chicken.

High density production of yeast cell mass

We have successfully developed process of high density yeast production with our 1500 L fermentation systems. We have a regularly production for service. Dried yeast biomass was successfully used as a supplement to feed.

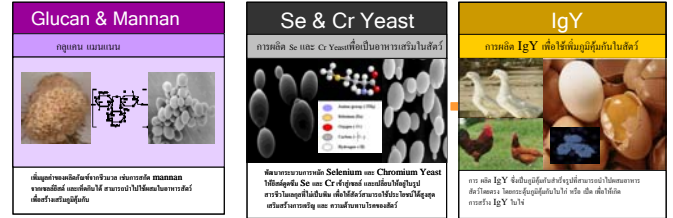
Virus like particles

Influenza virus like particles (VLP) have been demonstrated to be a promising alternative to influenza vaccine. Since VLP lacks of viral genetic material, it is safe and suitable for vaccine manufacturing. The high yield of VLP can be produced by Baculovirus- insect cell system. Baculovirus was genetically engineered to have HA, NA and M1 gene inserted into its genome and then infected to Sf-9 insect cell. The Influenza VLP was released into culture medium after recombinant HA, NA and M1 proteins produced and assembled.

Feed Industrial Products



Bio-Active Compounds



Selected Publications :

Mekvichitsaeng, P., Poomputsa, K., Dechmahitkul, W., and Akeprathumchai, S., (2006) Recombinant Dengue Envelope Protein Production in Insect Cell Culture. The 18th Annual Meeting of the Thai Society for Biotechnology “Biotechnology: Benefits & Bioethics” November 2-3, The Montain Riverside Hotel Bangkok, Thailand.

Petchprkob, P., Mekvichitsaeng, P., Akeprathumchai, S., Dechmahitkul, W., and Poomputsa, K. (2007) “Improvement of Baculovirus NPV Production from Insect Cell in Bioreactor for Use as Insecticide” Agricultural Science Journal 38(6) Nov-Dec 2007

Dechmahitkul, W., Akeprathumchai, S., and Poomputsa, K and Mekvichitsaeng, P., . (2007) “ Study on Media Formulation and Production Process of *Bacillus subtilis* Spores for Animal Probiotics” KMUTT research and development journal vol.30 no.2 p.251-259.

Akeprthumchai, S., Tommeurd, w., Mekvichitsaeng, P., Dechmahitkul, W., Poomputsa, K. (2008) “Purification and Characterization of Egg-Derived Human Influenza Virus by Tangential Flow Ultrafiltration” Bangkok International Conference on Avian Influenza, 23-25 Jan 2008

Contact Person (Address):

Phenjun Mekvichitsaeng phenjun@pdti.kmutt.ac.th

Baculovirus – Insect Cell System

