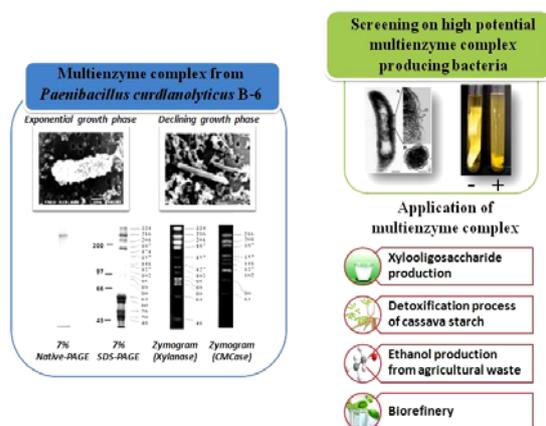


Enzyme Technology Laboratory



Researchers:

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- Enzyme technology, Protein purification, Protein Engineering

Asst. Prof. Dr. Khin Lay Kyu

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- Enzyme technology, Biodegradation of Plant Biomass

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- Enzyme technology, Microbiology

Dr. Patthra Pason

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- Enzyme technology, Protein purification

Achievements:

Elucidation on multienzyme complex system from facultative anaerobic bacterium, *Paenibacillus curdlanolyticus* B-6 for efficient lignocellulosic degradation.

Isolation of thermophilic anaerobic bacteria for efficient crystalline cellulose degradation.

Development of affinity chromatography for enzyme purification with corn hull column.

Using xylanolytic and cellulolytic enzymes to improve quality of cassava starch.

Production of xylooligosaccharide for functional food.

- To generate high quality master and Ph.D. students.
- To discover high potential enzymes for plant cell wall degradation under aerobic and anaerobic conditions.
- To elucidate on enzymes in basically and advance for identification of enzyme properties and characteristics.
- To utilize enzymes for biorefinery and other applications.

Research Areas:

Research in Enzyme Technology Laboratory is focused on the new knowledge and utilization of enzymes for industrial processes. The laboratory's activities include screening for high lignocellulosic degrading enzymes from microbial isolates and elucidation of enzyme characteristics to development of enzymatic processes in industry.

Microorganism: Screening and isolation of multienzyme complex under aerobic and anaerobic conditions for efficiently degradation of plant cell wall.

Enzyme: Elucidation on multienzyme complex and multiple enzyme system by studying on enzymatic hydrolysis, thermo stability, binding ability, synergism, etc.

Applications: Identification and optimization on enzyme production and hydrolysis for application in some industries for example sugar and oligosaccharides production, an efficient treatment for detoxification process of cassava starch and other biorefinery from lignocelluloses.

Selected Publications:

Waeonukul, R., Kyu, K.L., Sakka, K., Ratanakhanokchai, K. (2008) Effect of carbon sources on the induction of xylanolytic-cellulolytic multienzyme complex in *Paenibacillus curdlanolyticus* B-6, *Bioscience, Biotechnology, and Bioengineering*, 72, 321-328.

Waeonukul, R., Pason, P., Kyu K.L., Sakka K., Kougi, A., Mori, Y. and Ratanakhanokchai, K. (2009) Cloning, sequencing and expression of the gene encoding a multi-domain endo- β -1,4-xylanase from *Paenibacillus curdlanolyticus* B-6, and characterization of the recombinant enzyme, *Journal of Microbiology and Biotechnology*, 19, 277-285.

Jommueng bout, P., Pinitglang, S., Kyu, K.L. and Ratanakhanokchai, K. (2009) Substrate-binding site of family 11 xylanase from *Bacillus firmus* K-1 by molecular docking. *Bioscience, Biotechnology, and Biochemistry*, 73, 833-839.

Khucharoenphaisan, K., Tokuyama, S., Ratanakhanokchai K. and Kitpreechavanich, V. (2009) A comparative study of *Thermomyces*

lanuginosus strains on thermostable xylanase production. African Journal of Biotechnology, 8, 1608-1614.

Waeonukul, R., Kyu, K.L. and Ratanakhanokchai, K. (2009) Isolation and characterization of a multienzyme complex (cellulosome) of the *Paenibacillus curdlanolyticus* B-6 grown on Avicel under aerobic conditions, Journal of Bioscience and Bioengineering, 107, 610-614.

Chang, K.-L., Thitikorn-amorn J., Ratanakhanokchai, K. and Chen, S.-T. (2009) Entrapment immobilization of enzymes to improve monosaccharides production from rice straw. International Journal of Electrical energy systems, 1, 83-86.

Sornyotha, S., Kyu, K.L. and Ratanakhanokchai, K. (2010) An efficient treatment for detoxification process of cassava starch by plant cell wall-degrading enzymes. Journal of Bioscience and Bioengineering, 109, 9-14.

Pason, P., Kosugi, A., Waeonukul, R., Tachaapaikoon, C., Ratanakhanokchai, K., Arai, T., Murata, Y., Nakajima, J. and Mori, Y. (2010) Purification and characterization of a multienzyme complex produced by *Paenibacillus curdlanolyticus* B-6. Applied Microbiology and Biotechnology, 85, 573-580.

Phitsuwan, P., Tachaapaikoon, C., Kosugi, A., Mori, Y., Kyu, K.L. and Ratanakhanokchai, K. (2010) A multienzyme complex (cellulosome) from a newly isolated alkalothermoanaerobacterium, *Tepidimicrobium xylanilyticum* BT14. Journal of Microbiology and Biotechnology, 20, 893-903.

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