



GREEN CHEMICAL PRODUCTION WITH DESIGNED BIOMASS ON BIOREFINERY

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ABSTRACT

The Seminar aims to provide an overview on potent microbes in our laboratory concerning their utilization in biorefineries for converting designed biomass into high value chemicals such as lactic acid. Non-edible biomass is required for design suitable for the strains and fermentation processes. Designed biomass is also cost-competitive substrate for overall processes including fermentations, which can simplify pretreatment and hydrolysis processes for lignocellulosic biomass with less-energy and less-cost. This Seminar will focus on our recent isolates, thermotolerant *Enterococcus mundtii* QU 25 and thermophilic *Enterococcus faecium* QU 50 as potent L (+)-LA producers. Strain QU 25 has been reported to (i) metabolize hexoses such as glucose, cellobiose and cello-oligosaccharides efficiently at 43°C; (ii) metabolize pentoses such as xylose, arabinose, and xylo-oligosaccharides with minimal by-products; (iii) be a first strain to metabolize pentoses homofermentatively and also even in continuous fermentation; (iv) efficiently produce LA with enhanced productivity in open (non-sterilized) repeated batch or fed-batch fermentation system; and (v) utilize homofermentatively a mixture of inedible biomass-derived sugars simultaneously without apparent carbon catabolite repression (CCR). On the other hand, we report a more novel lactic acid bacterium, strain QU 50, that has the potential to (i) ferment sugars at an optimal fermentation temperature of 50°C facilitating non-sterilized fermentation and favouring simultaneous saccharification and fermentation of renewable resources; (ii) utilize most lignocellulose-derived sugars (glucose, xylose, arabinose, mannose, galactose, and cellobiose) homofermentatively; (iii) produce LA homofermentatively even from low xylose concentration (~1.0 g/g yield); and (iv) efficiently co-ferment hexose and pentose simultaneously without CCR and by-products. These studies provide ideal wild-type microorganisms for economical LA production from renewable substrates. This Seminar also shows development of butanol production bioprocess with inedible resources through the concept "Designed biomass".

Date: 14 Dec 2017 (Thursday)

Time: 10:30 a.m. – 11:30 a.m.

Venue: Room Z406, 4/F, Block Z,
The Hong Kong Polytechnic University,
181 Chatham Road South, Hungghom,
Kowloon, Hong Kong

SPEAKER'S BIOGRAPHY

Prof. Kenji Sonomoto obtained his PhD in 1983 from Kyoto University (Japan) and he is currently Professor at Kyushu University (Japan). His fields of specialization are applied microbiology, enzyme engineering and genetic engineering. His research interests at present include (1) Diversified microbial utilization of renewable resources (Biodegradable plastic materials, Biodiesel fuel, Medically functional foods and food materials); (2) Bioprocess development and control of anaerobic fermentation (Lactic acid fermentation, Acetone-butanol-ethanol fermentation); (3) Biochemistry, genetics, fermentation and application of bacteriocins of lactic acid bacteria; (4) Peptide engineering of lantibiotics containing unusual amino acids; (5) Characterization of microbial diversity in fermented foods and human intestine by molecular approaches (*Nukadoko*, Correlation between microflora and allergy); and (6) Characterization of chemical signals controlling microbial behavior (Bacterial pheromone). Prof. Sonomoto is membership of The Society for Biotechnology, Japan (President; Jun. 2013 – May 2015); Japan Society for Lactic Acid Bacteria (President; Jul. 2015 – present); Japan Society for Bioscience, Biotechnology, and Agrochemistry; American Society for Microbiology. He has authored over 600 journal articles, 110 patents and 52 book chapters. He received many awards such as the Society Award of the Society for Biotechnology, Japan titled "Basic study on smart fermentation technology by designed approaches" in 2016.

*** All Interested Are Welcome ***

For further information, please contact Dr. Ben S.-Y. Leu at Tel. 3400-8322 or syleu@polyu.edu.hk. Free Admission. Certificates of attendance will be provided to participants if they attend the whole lecture.