

## References

- Abu-Ruwaida, A.S., Banat, I.M., Haditirto, S., Salem, S. and Kadri, M. 1991a. Isolation of biosurfactant producing bacteria-product characterization and evaluation. *Acta. Biotechnol.* 11: 315-324.
- Abu-Ruwaida, A.S., Banat, I.M., Haditirto, S. and Khamis, A. 1991b. Nutrition requirements and growth characteristics of biosurfactant producing *Rhodococcus* bacterium. *World. J. Microbiol. Biotechnol.* 7: 53-61.
- Banat, I.M. 1993. The isolation of a thermophilic biosurfactant producing *Bacillus* sp. *Biotechnol. Lett.* 15: 591-594.
- Banat, I.M. 1995. Biosurfactants production and possible uses in microbial enhanced oil recovery and oil pollution remediation : a review. *Biores. Technol.* 53: 1-12.
- Banat, I.M., Makkar, R.S. and Cameotra, S.S. 2000. Potential commercial applications of microbial surfactants. *Appl. Microbiol. Biotechnol.* 53: 459-508.
- Banat, I.M., Samarah, N., Murad, M., Horne, R. and Banerjee, S. 1991. Biosurfactant production and used in oil tank clean-up. *World. J. Microbiol. Biotechnol.* 7: 80-88.
- Barathi, S. and Vasudevan, N. 2001. Utilization of petroleum hydrocarbons by *Pseudomonas fluorescens* isolated from a petroleum-contaminated soil. *Environ. International.* 26: 413-416.
- Barry, A.L. and Thronsberry, C. 1980. Susceptibility : Diffusion Test Procedures. *In* *Manual of Clinical Microbiology* (ed. E.H. Lenette). pp. 463-473. Washington, DC : American Society for Microbiology, Press.
- Banincasa, M., Contiero, J., Manresa, M.A. and Moraes. 2001. Rhamnolipid production by *Pseudomonas aeruginosa* LBI growing on soapstock as the sole carbon source. *J. Food. Eng.* 6-12.

- Besson, F. and Michel, G. 1992. Biosynthesis of iturin and surfactin by *Bacillus subtilis* : evidence for amino acid activating enzymes. *Biotechnol. Lett.* 14: 1013-1018.
- Bryant, F.O. 1990. Improved method for the isolation of biosurfactant glycolipids from *Rhodococcus* sp. strain H13A. *Appl. Environ. Microbiol.* 56: 1497-1496.
- Budsabun, T. 1996. Surface tension reduction of *Bacillus subtilis* 3/38 culture broth obtained from different conditions. Master of Science thesis in Microbiology, Chulalongkorn University, Bangkok, Thailand 100p.
- Busscher, H.J., Van der Mei, H.C. and Van der Mei, H.C. 1996. Biosurfactants from thermophilic dairy streptococci and their potential role in the fouling control of heat exchanger plates. *Appl. Microbiol. Biotechnol.* 16: 15-21.
- Carmeotra, S. S., and Singh, H. D. 1990. Purification and characterization of alkane solubilizing factor produced by *Pseudomonas* PG-1. *J. Ferment Bioeng.* 69: 341-344.
- Cirigliano, M.C. and Carman, G.M. 1984. Isolation of bioemulsifier from *Candida lipolytica*. *Appl. Environ. Microbiol.* 48: 474-750.
- Cirigliano, M.C. and Carman, G.M. 1985. Purification and characterization of liposan, and bioemulsifier from *Candida lipolytica*. *Appl. Environ. Microbiol.* 51: 846-850.
- Clint, J. H. 1992. Nature of surfactant. *In* *Surfactant Aggregation*. pp. 1-11. New York: Chapman and Hall.
- Cooper, D.G. and Goldenberg, B.G. 1987. Surface active agents from to *Bacillus* species. *Appl. Environ. Microbiol.* 53: 224-229.
- Cooper, D.G, MacDonald, C.R., Duff, S. J.B. and Kosaric, N. 1981. Enhanced production of surfactin from *B. subtilis* by continuous product removal and metal cation additions. *Appl. Environ. Microbiol.* 42: 408-412.
- Cooper, D.G. and Paddock, D.A. 1983. *Torulopsis petrophillum* and surface activity. *Appl. Environ. Microbiol.* 46: 1426-1429.

- Cooper, D.G. and Paddock, D.A. 1984. Production of biosurfactant from *Torulopsis bombicola*. Appl. Environ. Microbiol. 47: 173-176.
- Denger, K. and Schink, B. 1995. New halo- and thermotolerant fermenting bacteria producing surface-active compounds. Appl. Microbiol. Biotechnol. 44: 161-166.
- Davila, A., Marohal, F. and Vandecasteele, J. 1992. Kinetics and balance of a fermentation free from product inhibition : sophorose lipid production by *Candida bombicola*. Appl. Microbiol. Biotechnol. 38: 6-11.
- Dawson, R.M.C., Elliott, D.C., Elliot, W.F. and Johns, K.M. 1986. Method for detection of biochemical compounds on paper and thin-layer chromatograms with some notes on separation. *In* Data for Biochemical Research. 3<sup>rd</sup> ed. pp. 453-502. The Bath Press, Avon.
- Desai, J.D. and Banat, I.M. 1997. Microbial production of surfactant and their commercial potential. Microbiol. Mol. Biol. Rev. 61: 47-64.
- Deziel, E., Paquette, G., Villemur, R., Lepine, F. and Bisailon, J. 1996. Biosurfactant production by soil *Pseudomonas* strain growing on polycyclic aromatic hydrocarbons. Appl. Environ. Microbiol. 62: 1908-1912.
- Fiechter, A. 1992. Biosurfactant : moving towards industrial application. Trends. Biotechnol. 10: 208-217.
- Finnerty, W.R. 1994. Biosurfactants in environmental biotechnology. Curr. Opin. Biotechnol. 5: 291-295.
- Fox, S.L. and Bala, G.A. 2000. Production of surfactant from *Bacillus subtilis* ATCC 21332 using potato substrates. Biores. Technol. 75: 235-400.
- Ghurye, G.L. and Vipulanandan, D. 1994. A practical approach to biosurfactant production using non-aseptic fermentation of mixed cultures. Biotechnol. Bioeng. 44: 661-666.
- Gobbert, U., Lang, S. and Wanger, F. 1984. Sophorose lipid formation by resting cells of *Torulopsis bombicola*. Biotechnol. Lett. 6: 225-230.

- Goswami, P. and Singh, H.D. 1991. Different modes of hydrocarbon uptake by two different *Pseudomonas* spp. *Biotechnol. Bioeng.* 37: 1-11.
- Guerra-Santos, L.H., Kappelli, O. and Fiechter, A. 1984. *Pseudomonas aeruginosa* biosurfactant production in continuous culture with glucose as carbon source. *Appl. Environ. Microbiol.* 48: 301-305.
- Guerra-Santos, L.H., Kappelli, O. and Fiechter, A. 1986. Dependence of *Pseudomonas aeruginosa* continuous culture biosurfactant production on nutritional and environmental factors. *Appl. Microbiol. Biotechnol.* 24: 443-448.
- Gurjar, M., Khire, J.M. and Khan, M.I. 1995. Bioemulsifier production by *Bacillus stearothermophilus* VR-8 isolate. *Lett. Appl. Microbiol.* 21: 83-86.
- H-Kittikun, A., Abe, N., Kamio, Y. and Izaki, K. 1993. Isolation, purification and identification of antibiotics produced by *Bacillus* MUV4. *Annual Report. ICBiotech.* 6: 379-390.
- Hommel, R.K., Weber, L., Weiss, A., Himmelreich, U., Rilke, O. and Kleber, H.P. 1994. Production of sophorose lipid by *Candida (Torulopsis) apicola* grown on glucose. *J. Biotechnol.* 26: 199-205.
- Horowitz, S., Gilbert, J.N. and Griffin, W.M. 1990. Isolation and characterization of a surfactant produced by *Bacillus licheniformis* 86. *J. Ind. Microbiol.* 6: 243-248.
- Horowitz, S. and Griffin, W.M. 1991. Structural analysis of *Bacillus licheniformis* 86 surfactant. *J. Ind. Microbiol.* 7: 45-52.
- Islam, J. 2001. Screening of biosurfactant producing bacteria and optimization of production process. Master of science thesis in Biotechnology. Prince of Songkla University.
- Javaheri, M., Jenneman, G.E., McInerney, M.J and Knapp, R.M. 1985. Anaerobic production of biosurfactant by *Bacillus licheniformis* JF-2. *Appl. Environ. Microbiol.* 44: 698-700.

- Jenny, K., Kappeli, O. and Fiechter, A. 1991. Biosurfactants from *Bacillus licheniformis*: structure analysis and characterization. *Appl. Microbiol. Biotechnol.* 36: 5-13.
- Johnson, V., Singh, M., Saini, V.S., Dilip, Adhikari, K., Sista, V. and Yadov, N.K. 1992. Bioemulsifier production by an Oleaginous Yeast *Rhodotorula glutinis* IIP-30. *Biotechnol. Lett.* 14: 487-490.
- Jung, H.K., Lee, J.B., Yim, G.B. and Kim, E.K. 1995. Properties of microbial surfactants, S-acid. *Korean. Biotechnol. Bioeng.* 10: 71-77.
- Kappeli, O. and Finnerty, W.R. 1979. Partition of alkane by and extracellular vesicle derived from hexadecane-grown *Acinetobacter*. *J. Bacteriol.* 140: 707-712.
- Khire, J.M. and Khan, M.I. 1994. MEOR : Microbes and the subsurface environment. *Enzyme. Microb. Technol.* 16: 258-259.
- Kim, S.H., Lim, E.J., Lee, J.D. and Lee, T.H. 2000. Purification and characterization of biosurfactant from *Nocardia* sp. L-417. *Biotechnol. Appl. Biochem.* 31: 249-253.
- Kim, H.S., Yoon, B.D., Choung, D.H. , Oh, H.M., Katsuragi, T. and Tani, Y. 1999. Characterization of a biosurfactant, mannosylerythritol lipid produced from *Candida* sp. SY16. *Appl. Microbiol. Biotechnol.* 52: 713-721.
- Kim, H.S., Yoon, B.D., Lee, C.H., Suh, H.H., Oh, H.M., Katsuragi, T. and Tani, Y. 1997. Production and properties of a lipopeptide biosurfactant from *Bacillus subtilis* C9. *J. Ferment. Bioeng.* 84: 41-46.
- Kitamoto, D., Yanagishita, H., Shinbo, T. Nakane, T. Kamosawa, C. and Nakahara, T. 1993. Surface active properties and antimicrobial activities of mannosylerythritol : lipids as biosurfactants produced by *Candida antarctica*. *J. Biotechnol.* 29: 91-96.

- Kretschmer, A., Bock, H. and Wagner, F. 1982. Chemical and physical characterization of interfacial-active lipids from *Rhodococcus erythropolis* grown on n-alkane. *Appl. Environ. Microbiol.* 44: 864-870.
- Lee, L.H. and Kim, J.H. 1993. Distribution of substrate carbon in sophorose lipid production by *Torulopsis bombicola*. *Biotechnol. Lett.* 15: 263-266.
- Li, Z.Y., Lang, S., Wangner, F., Witte, L. and Wray, V. 1984. Formation and identification of interfacial-active glycolipids from resting microbial cells of *Arthrobacter* sp. and potential use in tertiary oil recovery. *Appl. Environ. Microbiol.* 48: 610-617.
- Lin, C., Carswell, K.S., Sharma, M.M. and Georgiou. 1994. Continuous production of the lipopeptide biosurfactant of *Bacillus licheniformis* JF-2. *Appl. Microbiol. Biotechnol.* 41: 281-285.
- MacDonald, C.R., Cooper, D.G. and Zajic, J.E. 1981. Surface-active lipids from *Nocardia erythropolis* grown on hydrocarbons. *Appl. Environ. Microbiol.* 41: 117-123.
- Makkar, R.S. and Cameotra, S.S. 1997a. Biosurfactant production by thermophilic *Bacillus subtilis* strain. *J. Ind. Microbiol. Biotechnol.* 18: 37-42.
- Makkar, R.S. and Cameotra, S.S. 1997b. Utilization of molasses for biosurfactant production by two *Bacillus* strains on thermophilic conditions. *J. Am. Oil. Chem. Soc.* 74: 887-889.
- Makkar, R.S. and Cameotra, S.S. 1998. Synthesis of biosurfactant in extreme conditions. *Appl. Microbiol. Biotechnol.* 50: 520-529.
- McInerney, M.J., Javaheri, M. and Nagle, D.P. 1990. Properties of the biosurfactant produced by *Bacillus licheniformis* strain JF-2. *J. Ind. Microbiol.* 5: 95-102.
- McNeill, G.P. and Yamane, T. 1991. Further improvements in the yield of monoglycerides during enzymatic glycerolysis of fats and oils. *J. Am. Oil. Chem. Soc.* 68: 6-10.

- Morikawa, M., Daido, H., Takao, T., Murata, S., Shimonishi, Y. and Imanaka, T. 1993. A new lipopeptide biosurfactant produced by *Arthrobacter* sp. strain MIS 38. J. Bacteriol. 175: 6459-6466.
- Mulligan, C.N. and Gibbs, B.F. 1989. Correlation of nitrogen with biosurfactant production by *Pseudomonas aeruginosa*. Appl. Environ. Microbiol. 55: 3016-3019.
- Navon-Venezia, S. Zosim, Z., Gottlieb, A., Legmann, R. Carmeli, S., Ron, E.Z. and Rosinberg, E. 1995. Alasan, a new bioemulsifier from *Acinetobacter radioresistens*. Appl. Environ. Microbiol. 61: 290-297.
- Neu, T.R., Hartner, T. and Poralla, K. 1990. Surface active properties of viscosin-a peptidolipid antibiotic. Appl. Microbiol. Biotechnol. 32: 518-520.
- Neu, T.R. and Poralla, K. 1990. Emulsifying agent from bacteria isolated during screening for cells with hydrophobic surfaces. Appl. Microbiol. Biotechnol. 32: 521-525.
- Ohno, A., Ano, T. and Shoda, M. 1995. Effect of temperature on production of lipopeptide antibiotics, iturin A and surfactin by a dual producer, *Bacillus subtilis* RB17, in solid-state fermentation. J. Ferment. 80: 517-519.
- Peypoux, F. and Michel, G. 1992. Controlled biosynthesis of Val-7 and Leu-7 surfactins. Appl. Microbiol. Biotechnol. 36: 515-517.
- Pruthi, V. and Cameotra, S.S. 1997a. Production of a biosurfactant exhibiting excellent emulsification and surface active properties by *Serratia marcescens* : short communication. World. J. Microbiol. Biotechnol. 13: 133-135.
- Pruthi, V. and Cameotra, S.S. 1997b. Production and properties of biosurfactant synthesized by *Arthrobacter protophormiae*—an antarctic strain : short communication. World. J. Microbiol. Biotechnol. 13: 137-139.
- Passeri, A. 1992. Marine biosurfactants IV. Production, characterization and biosynthesis of anionic glucose lipid from marine bacterial strain MM1. Appl. Microbiol. Biotechnol. 37: 281-286.

- Robert, M., Mercade, M.E., Bosch, M.P., Parra, T.L., Espuny, M.J., Manresa, M.A. and Guinea, J. 1989. Effect of the carbon source on biosurfactant production by *Pseudomonas aeruginosa* 44T. *Biotechnol. Lett.* 11: 871-874.
- Roongsawang, N., Haniyavarn, J. and Thaniyavarn, S. 1999. Properties and biosurfactant produced by *Bacillus* sp. strain KP-2. *Thai J. Biotechnol.* 1: 54-60.
- Rosenberg, E. and Ron, E.Z. 1999. High- and low-molecular mass microbial surfactants. *Appl. Microbiol. Biotechnol.* 52: 154-162.
- Rosenberg, E., Zukerberg, A., Rubinovitz, V. and Gutnick, D.L. 1979. Emulsifier *Arthrobacter* RAG-1: isolation and emulsifying properties. *Appl. Environ. Microbiol.* 37: 402-408.
- Sandrin, C., Peypoux, F. and Michel, G. 1990. Coproduction of surfactin and Iturin A, lipopeptides with surfactant and antifungal properties, by *Bacillus subtilis*. *Biotechnol. Appl. Biochem.* 12: 370-375.
- Sheppard, J. D. and Cooper, D. G. 1990. The effect of biosurfactant on oxygen transfer in a cyclone column reactor. *J. Chem. Technol. Biotechnol.* 48: 325-336.
- Singh, M., Saini, V., Adhikari, D.K., Desai, J.D. and Sista, V.R. 1990. Production of bioemulsifier by SCP producing strain of *Candida tropicalis* during hydrocarbon fermentation. *Biotechnol. Lett.* 12: 743-746.
- Suttivanitchakul, B., Thaniyavarn, J. and Thaniyavarn, S. 1999. Biosurfactant production by *Bacillus licheniformis* F2.2. *Thai. J. Biotechnol.* 46-53.
- Thimon, L, Peypoux, F.. and Michel, G. 1995. Interactions of surfactant from *Bacillus subtilis*, with inorganic cations. *Biotechnol. Lett.* 14: 713-718.
- Van Dyke, M.I., Couture, P., Brauer, M., Lee, H. and Trevors, J.T. 1993. *Pseudomonas aeruginosa* UG2 rhamnolipid biosurfactant : structural characterization and their use in removing hydrophobic compounds from soil. *Can. J. Microbiol.* 39: 1071-1078.



- Vollbrecht, E., Heckmann, R., Wray, V., Nimtz, M. and Lang, S. 1998. Production and structure elucidation of di- and oligosaccharide lipids (biosurfactants) from *Tsukamurella* sp. nov. *Appl. Microbiol. Biotechnol.* 50: 530-537.
- Wang, S.D. and Wang, D.I.C. 1990. Mechanisms for biopolymer accumulation in immobilized *Acinetobacter calcoaceticus* system. *Biotechnol. Bioeng.* 36: 402-410.
- Yakimov, M.M., Timmis, K.N., Wray, V. and Fredrickson, H.L. 1995. Characterization of a new lipopeptide surfactant produced by thermotolerant and halotolerant substrate *Bacillus licheniformis* BAS50. *Appl. Microbiol. Biotechnol.* 61: 1706-1713.
- Yakimov, M.M., Fredrickson, H.L. and Timmis, K.N. 1996. Effect of heterogeneity of hydrophobic moieties on surface activity of lichenycin A, a lipopeptide biosurfactant from *Bacillus licheniformis* BAS50. *Biotechnol. Appl. Biochem.* 23: 13-18.
- Zhang, Y. and Miller, R.M. 1992. Enhanced octadecane dispersion and biodegradation by a *Pseudomonas* rhamnolipid surfactant (biosurfactant). *Appl. Environ. Microbiol.* 56: 3276-3282.
- Zhang, Y., Maier, W.J. and Miller, R.M. 1997. Effect of rhamnolipids on the dissolution, bioavailability, and biodegradation of phenanthrene. *Environ. Sci. Technol.* 31: 2211-2217.