

## Characterization of biosurfactants produced by petroleum microbial consortia.

Célio Fernando F. Angolini<sup>1</sup>, Georgiana F. da Cruz<sup>1</sup>, Eugênio V. dos Santos Neto<sup>2</sup>, Anita J. Marsaioli<sup>1</sup>

[anita@iqm.unicamp.br](mailto:anita@iqm.unicamp.br)

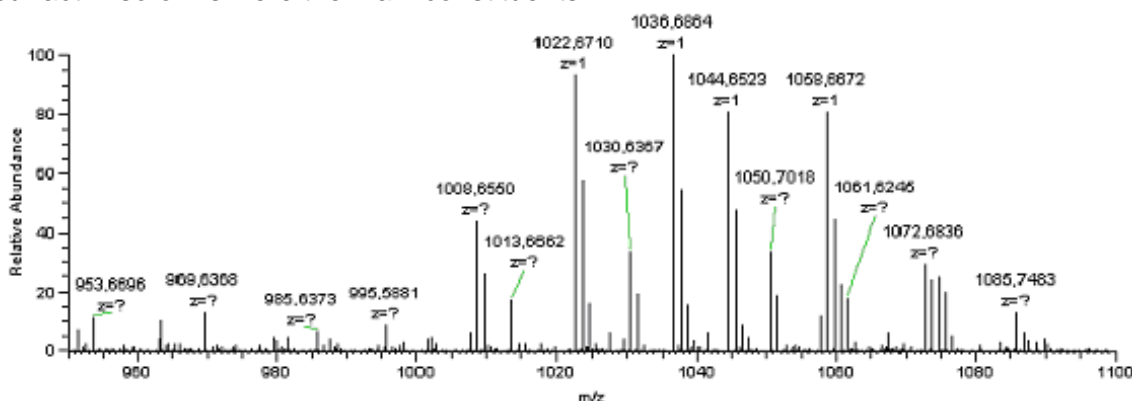
<sup>1</sup> Instituto de Química – UNICAMP POB 6154, 13084-862, Campinas-SP, Brazil.

<sup>2</sup> PETROBRAS Centro de Pesquisas e Desenvolvimento (P&D) , Cidade Universitária, Q-7, 21949-900, Rio de Janeiro-RJ, Brazil.

Petroleum hydrocarbon biodegradation is a complex process that depends on the oil and reservoir compositions as well as particular conditions favoring microorganism growth in a lipophilic environment.<sup>1</sup> However, the low bioavailability of hydrophobic organic compounds (HCOs) to microorganism could be a limiting step during the biodegradation process. Consequently to enhance the HCO solubility and bioavailability many bacteria produce exopolimeric substances (EPS), usually biosurfactants<sup>2</sup> which increase the aqueous dispersion of poorly soluble compounds by many orders of magnitude and change the affinity between microbial cells and hydrocarbons facilitating their biodegradation.<sup>3</sup>

Knowing that oil biodegradation is more effective with a microbial consortium than with pure strains, and depends on oil surface modification by biosurfactants produced by some of the microbes, present study aimed at the characterization of biosurfactants produced by microbial consortia recovered from two oil samples of different levels of biodegradation from Pampo Sul Field, Campos Basin, Rio de Janeiro, Brazil.

Assays to produce biosurfactant used 9,10-dihydrophenantrene (1), *n*-nonadecane (2), nonadecanoic acid (3), mixture of **1**, **2** and **3**, slight biodegraded crude oil (P1) and heavy biodegraded crude oil (P2). The crude EPS were characterized by mass spectrometry using LTQ Orbitrap XL (*Thermo Scientific*) with electrospray ionization and tandem mass spectrum analysis (ESI-MS/MS) revealing that surfactin isoforms were the main constituents.



[1] Providenti, M. A., Flemming, C. A., Lee, H., Trevors, J. T. *FEMS Microbiology Ecology* **1995**, 17, 15-26.

[2] Koch, A. K., Kappeli, O., Fiechter, A., Reiser, J. *Journal of Bacteriology* **1991**, 173, 4212-4219.

[3] Barkay, T.; Navon-Venezia, S.; Ron, E. Z.; Rosenberg, E. *Applied and Environmental Microbiology* **1999**, 65, 2697-2702.