

FTIR Spectroscopy for in vitro Screening in Microbial Biotechnology

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Abstract : Globally there is a dramatic increase in the demand for food, energy, materials and clean water since natural resources are limited. As a result, industries are looking for ways to reduce rest materials and to improve resource efficiency. Microorganisms have a high potential to be used as bio factories for the production of primary and secondary metabolites that represent high-value bio-products (enzymes, polyunsaturated fatty acids, bio-plastics, glucans, etc.). In order to find good microbial producers, to design suitable substrates from food rest materials and to optimize fermentation conditions, rapid analytical techniques for quantifying target bio products in microbial cells are needed. In the EU project FUST (R4SME, Fp7), we have developed a fully automated high-throughput FUST system based on micro-cultivation and FTIR spectroscopy that facilitates the screening of microorganisms, substrates and fermentation conditions for the optimization of the production of different high-value metabolites (single cell oils, bio plastics). The automated system allows the preparation of 100 samples per hour. Currently, The FUST system is in use for screening of filamentous fungi in order to find oleaginous strains with the ability to produce polyunsaturated fatty acids, and the optimization of cheap substrates, derived from food rest materials, and the optimization of fermentation conditions for the high yield of single cell oil.

Keywords : FTIR spectroscopy, FUST system, screening, biotechnology

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