INSTRUMENTATION BASED ON RAMAN SPECTROSCOPY FOR MONITORING MICROORGANISMS OF BIOTECHNOLOGICAL INTEREST

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The main goal of our project is the development of specialized instrumentation and methodology to monitor metabolic states of microorganisms in order to optimize cultivation process for biotechnological applications using 2D optical tweezers combined with Raman spectroscopy. Raman spectroscopy offers a powerful alternative analytical method for the detection and identification of different substances in biological samples, such as bacteria and yeast.

Here the attention is given to the different oil-producing yeast strains and various bacteria which accumulate biodegradable polyesters (PHB) to exploit their potential applications in the biotechnology field. In order to utilize selected microorganisms for efficient biotechnological production, the influence of different cultivation parameters (such as the effects of temperature regime and medium composition) on cells can be monitored using our dedicated instrumentation. In our preliminary experiments we found that if the yeast is cultured under the right conditions up to 40 percent of the cell weight can be oil. In this work yeast strains of *Metschnikowia* were used for screening of lipid production from waste substrates. Fatty acid profiles were measured by gas chromatography. In case of polyesters producing bacteria content of PHB can be as high as 90 percent for selected bacterial strains.

The whole procedure - from sample preparation to advanced chemometric methods - can take several minutes. Thus, Raman spectroscopy proved to be a very efficient tool for the rapid quantitative/qualitative analyses of various microorganisms. We believe that our study will be of significant assistance to research groups being involved in biotechnological applications.

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