

## **Unconventional techniques for intensifying the synthesis of liquid biofuels**

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For the first topic addressed in the elaboration of the thesis, the effect of microwaves on the metabolic activity of *Saccharomyces cerevisiae* cells in the process of alcoholic fermentation of glucose, were proposed as main objectives: the realization of an experimental laboratory installation, allowing a good control of the temperature and microwave dose during the studies carried out; the identification of a microwave exposure field for which to obtain an intensification of the fermentation process; tracking the effect of microwaves on the viability, morphology and structural integrity of yeast cells. It was also proposed to model the fermentation reactor to confirm the degree of homogeneity in the environment and the lack of temperature gradients that could have a negative impact on the conduct of fermentation studies. The second topic addressed in this thesis, the synthesis of inferior alcohol esters with vegetable oils by unconventional methods, had as main objective the realization of a detailed comparative study of the methods for process intensification which can be applied for the transesterification reaction in the synthesis of biodiesel, from the point of view of both the methyl ester content and the specific energy consumptions in continuous processes at short reaction times. A secondary objective was the potential for the use of ultrasound to intensify the synthesis of ethyl esters, and to obtain FAEE products of high purity, which can be used as alternative solvents. The equipment used to carry out these studies consisted of: the Vibracell VCX750 ultrasonic processor, an ultrasonic processor based on an advanced technology, in which the output power can be varied, both the output power and the energy can be monitored; MMM Clamp-on, a multi-frequency sonic and ultrasonic vibrations technology, which offers the possibility of obtaining high-efficiency active powers for a wide band of sonic and ultrasonic vibrations, this power being able to be supplied to metal containers with walls of different thicknesses.