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Fabrication of Hyperbranched Polyglycerols Microcapsules from Microfluidics guided by Artificial Neural Networks

Andressa Aparecida Alves[1], Alvaro Antonio Alencar de Queiroz[2], Alfredo Antonio Alencar Exposito de Queiroz[3]

[1]Universidade Federal de Itajubá (*Instituto de Física e Química*) , [2]Instituto de Pesquisas Energéticas e Nucleares (*Centro de Biotecnologia*) , [3]Universidade de São Paulo (*Instituto de Física de São Carlos*)

e-mail: andressa-a-alves@unifei.edu.br

In recent years, the microfluidic approach has received a lot of attention from the scientific community due to the simple and efficient synthesis of highly monodisperse microcapsules used in a variety of applications in biotechnology and medicine such as, for example, materials synthesis, drug encapsulation, among others [1,2]. Thus, in this work, hyperbranched polyglycerol microcapsules (HPGM) were developed using microfluidic technology. Artificial neural network (ANN) feed-forward using multilayer perceptron architecture was trained and applied to model and predict the microfluidic process. The HPGM produced were characterized by scanning electron microscope (SEM), attenuated total reflection-Fourier transform infrared (ATR-FTIR) and thermogravimetric analysis (TGA). The fabricated HPGM showed spherical size and monomodal distribution with an average diameter of 29 μm. The developed ANN proved to be efficient predictor, showing well agreement with the experimental data (R^2=0.9983). Based on these results in this research, it was found that the microfluidic device for producing HPGM was successfully developed since it was possible to synthesize microcapsules with targeted properties, monodispersed with high stability and low porosity. In this way, microfluidic technology guided by ANN can be used to synthesize HPGM for biotechnology processes.

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References:

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