

## A Bacterial Foraging Optimization Algorithm Applied to the Synthesis of Polyacrylamide Hydrogels

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**Abstract :** The Bacterial Foraging Optimization (BFO) algorithm is inspired by the behavior of bacteria such as *Escherichia coli* or *Myxococcus xanthus* when searching for food, more precisely the chemotaxis behavior. Bacteria perceive chemical gradients in the environment, such as nutrients, and also other individual bacteria, and move toward or in the opposite direction to those signals. The application example considered as a case study consists in establishing the dependency between the reaction yield of hydrogels based on polyacrylamide and the working conditions such as time, temperature, monomer, initiator, crosslinking agent and inclusion polymer concentrations, as well as type of the polymer added. This process is modeled with a neural network which is included in an optimization procedure based on BFO. An experimental study of BFO parameters is performed. The results show that the algorithm is quite robust and can obtain good results for diverse combinations of parameter values.

**Keywords :** bacterial foraging, hydrogels, modeling and optimization, neural networks

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