Comparison of heuristic methods for developing optimized neural network based models to predict amphiphobic behavior of fluorosilica coated surfaces

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Comparison of Heuristic Methods for Developing Optimized Neural Network based Models to Predict Amphiphobic Behavior of fluorosilica coated surfaces

Abstract

In this paper, in order to predict contact and sliding angles, heuristic methods such as genetic algorithm (GA), harmonic search (HS), simulated annealing algorithm (SAA), and gravitational search algorithm (GSA) were evaluated and the performance of them were compared to particle swarm optimization (PSO) for training neural network to develop adaptive and optimum model for predicting issue. To develop the models, experimental data were divided into training data and testing data. By using training data and feed forward structure for the neural network and also using particle swarm optimization for training the neural network based models, an optimum models was developed. Obtained results showed that SAA-based model presents more adaptive results than other methods. The regression index of proposed models for contact and sliding angles by using SAA were 0.9979 and 0.9997, respectively. As it can be seen, these values are close to unit and it means the reliable performance of the models and also it presents more enhanced results than PSO trained model.

Keywords: Amphiphobicity; Neural network; Optimized model; Contact angle; Sliding angle; Solid Surface